United States Department of the Interior
FISH AND WILDLIFE SERVICE
Snake River Fish and Wildlife Office
1387 S. Vinnell Way, Room 368
Boise, Idaho 83709
Telephone (208) 378-5243
http://IdahoES.fws.gov

APR 0 3 2006

Jane L. Cottrell
Forest Supervisor
Nez Perce National Forest
Route 2, Box 475
Grangeville, Idaho 83530

Subject: Red Pines Project, Idaho County, Idaho--Biological Opinion and Concurrence
File #106.0200 F-06-0424(0067)

Dear Ms. Cottrell:

This letter transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) and concurrence on the effects to listed species from the Red Pines Project (Project), Red River Ranger District, Idaho County, Idaho. In a letter dated October 20, 2005 and received by the Service on October 24, 2005, the Nez Perce National Forest (Forest) requested formal consultation on the determination under section 7 of the Endangered Species Act (Act) of 1973, as amended, that the Project is likely to adversely affect bull trout (*Salvelinus confluentus*). The Service has concluded bull trout are not likely to be jeopardized by the proposed project.

The Forest determined that the proposed action is not likely to adversely affect the Canada lynx (*Lynx canadensis*) and the bald eagle (*Haliaeetus leucocephalus*), and is not likely to jeopardize the continued existence of the gray wolf (*Canis lupus*). The Forest also determined that the action will have no effect on MacFarlane's four-o'clock (*Mirabilis macfarlanei*), water howellia (*Howellia aquatilis*), Ute ladies'-tresses (*Spiranthes diluvialis*), and Spalding's catchfly (*Silene spaldingii*). The Service acknowledges these determinations.

The enclosed Opinion and concurrence are based primarily on our review of the proposed action as described in your October 2005 Biological Assessment (Assessment) regarding the effects of the proposed action on listed species and was prepared in accordance with section 7 of the Act. A complete administrative record of this consultation is on file at this office.

Thank you for your continued interest in the conservation of threatened and endangered species. Please contact Clay Fletcher at (208) 378-5256 if you have questions concerning this Opinion and concurrence.

Sincerely,

Gary L Burton

for Jeffery L. Foss, Field Supervisor
Snake River Fish and Wildlife Office

Enclosure

cc: FWS, Portland (Salata)
IDFG, Region II, Lewiston (Hennekey)
NOAA Fisheries, Grangeville (Brege)
NPT, Lapwai (Jones)

BIOLOGICAL OPINION
AND CONCURRENCE
FOR THE
RED PINES PROJECT
NEZ PERCE NATIONAL FOREST
F-06-0424(0067)

APRIL 2006

FISH AND WILDLIFE SERVICE

SNAKE RIVER FISH AND WILDLIFE OFFICE

BOISE, IDAHO

TABLE OF CONTENTS

TABLES iii
INTRODUCTION 1
CONSULTATION HISTORY 1
INFORMAL CONSULTATION 2
Canada Lynx 2
Gray Wolf 3
BIOLOGICAL OPINION 3
I. DESCRIPTION OF PROPOSED ACTION 3
A. Action Area 3
B. Proposed Action 4
1. Vegetation Treatments 4
2. Watershed Restoration 5
3. Implementation Schedule 5
4. Monitoring 6
II. STATUS OF THE SPECIES 6
A. Listing History 6
B. Reasons for Listing 6
C. Species Description 7
D. Life History 7
E. Population Dynamics 8
F. Status and Distribution 9
1. Columbia River Distinct Population Segment (DPS) 9
2. Clearwater River Management Unit 10
3. South Fork Clearwater River Core Area 10
G. Consulted-on Effects within the DPS 11
H. Conservation Needs 11
I. Critical Habitat 12
III. ENVIRONMENTAL BASELINE 12
A. Status of the Species in the Action Area 12
B. Factors Affecting the Species in the Action Area 13

1. Red River 14
2. South Fork Clearwater River 16
C. Status Summary 17
IV. EFFECTS OF THE ACTION ON BULL TROUT 18
A. Direct and Indirect Effects 18
1. Vegetation Treatments 18
a. Timber Harvest 18
b. Fire/Fuels Management 20
2. Road Construction and Maintenance 22
3. Watershed Improvements/Restoration 24
a. Road decommissioning 24
b. Stream crossing improvements 24
c. In-channel reconstruction 25
d. Sediment trap decommissioning, fish structure maintenance, large woody debris placement 25
e. Soil restoration 25
f. Design criteria 25
4. Project Effects Summary 26
5. Risk Assessment 28
B. Effects of Interrelated or Interdependent Actions 29
V. CUMULATIVE EFFECTS 29
VI. CONCLUSION 30
VII. INCIDENTAL TAKE STATEMENT 31
A. Amount or Extent of Take 31
B. Effect of the Take 33
C. Reasonable and Prudent Measures 33
D. Terms and Conditions 33
E. Monitoring/Reporting 35
VIII. CONSERVATION RECOMMENDATIONS 35
IX. REINITIATION NOTICE 36
APPENDIX A. Ratings for habitat indicators by subwatershed and Habitat Quality Score. For scoring based on indicator conditions: Low=1, Moderate=2, High=3. Highest potential scores for the three indicators combined: High=12, Moderate= 8, and Low=4. 46

APPENDIX B. PROJECT DESIGN CRITERIA (PDC). This is a partial listing of design criteria only showing those addressing affects identified in this Opinion; see Assessment for a complete list. 47

APPENDIX C. Proposed restoration actions by subwatershed showing habitat condition, bull trout use, and total amount of restoration. 49

APPENDIX D. Risk Assessment for Bull Trout/Red Pines Watersheds (K. Thompson Nez Perce National Forest, 2006) 50

APPENDIX E. Rationale for Turbidity Threshold 60

TABLES

Table 1. Proposed vegetation treatments and road construction/reconditioning by subwatershed. 4

Table 2. Proposed restoration activities by subwatershed. 5

Table 3. Subwatersheds ranked as high condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information. 15

Table 4. Subwatersheds ranked as moderate condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use are shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information. 15

Table 5. Subwatersheds ranked as low condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use are shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information. 16

Table 6. Acres and type of vegetation treatment and yarding system by subwatershed. Habitat condition and bull trout use are also shown. For bull trout use (BT), SR = spawning and early rearing, and FMO = feeding, migrating and overwintering 20

Table 7. Burning prescription and slash piling method by subwatershed. Also shown are habitat condition (H = high, M = moderate, and L = low) and bull trout habitat use (SR = spawning and early rearing, and FMO = feeding, migrating, and overwintering) 21

Table 8. Miles of temporary road construction, road reconditioning , total miles of road work by subwatershed. Also shown are habitat condition (H = high, M = moderate, and L = low)

and bull trout habitat use (SR = spawning and early rearing, and FMO = feeding, migrating, and overwintering). 23
Table 9. Assessment of risk to bull trout from Project implementation based on habitat quality, bull trout use and project effects to Matix indicators (K. Thompson, Nez Perce National Forest, 2006). 28

INTRODUCTION

The Fish and Wildlife Service (Service) has prepared the following Biological Opinion (Opinion) in response to the Nez Perce National Forest's (Forest) request for formal consultation on the effects to bull trout (*Salvelinus confluentus*) from the proposed Red Pines Project (Project).

The Forest determined that the Project is likely to adversely affect bull trout. Based in part on the analysis presented in the Biological Assessment (Assessment) for this action, the Service concludes that the survival and recovery of bull trout populations will not be jeopardized by the Project.

CONSULTATION HISTORY

The Forest and the Service have had the following meetings and correspondence concerning the proposed Project.

July 14, 2003	The Service attended a Level 1 meeting where the Forest presented an overview of the Project.
December 3, 2003	The Service attended a Level 1 meeting where the Forest presented an overview of the Project as now combined with the previously proposed Red River Salvage Project.
April 12, 2005	The Service discussed the Project with other team members at a Level 1 meeting. Additional information needs were identified for the aquatic species Assessment and agreement was reached on the determinations for listed wildlife species.
May 12, 2005	The Service participated in a conference call on the Project with other Level 1 team members from the Forest and NOAA Fisheries. Additional information needs and clarifications were discussed and agreed upon. Of particular importance was the need for a timeline especially relating to the implementation of restoration activities.
June 30, 2005	The Service received an electronic version of the updated draft Assessment.
July 18, 2005	The Service participated in a conference call to discuss the updated draft Assessment and to identify any additional information needs. Again, the need for an implementation schedule for the restoration actions was one item specifically identified. NOAA fisheries provided wording by electronic mail to satisfy this need. The Forest provided the latest version of the graph showing sediment by activity for each affected subwatershed in the Project area.

September 7, 2005	The Service received from the Forest by electronic mail proposed text for the implementation schedule to be included in the Assessment.
September 14, 2005	The Service sent an electronic mail to the Forest stating that agreement had been reached on the determination for bull trout and the final contents of the Assessment.
October 24, 2005	The Service received the final Assessments and request for consultation.
December 13, 2005	The Service provided a draft version of the Opinion to the Forest for their review.
February 22, 2006	The Service notified the Forest that because the Forest had not yet provided final comments on the draft Opinion, the Service was stopping work on the consultation pending receipt of final comments.
February 27, 2006	The Service resumed the consultation after receiving final comments on the draft Opinion.

INFORMAL CONSULTATION

Canada Lynx

Service concurrence that the proposed action is not likely to adversely affect the Canada lynx is based on the following rationales presented in the Assessment.

1. Proposed harvest treatments will affect an insignificant amount of lynx habitat in two lynx analysis units (LAU). In LAU 3020304, 87 acres of denning habitat and 180 acres of foraging habitat will be treated resulting in the conversion of approximately one percent of the total suitable habitat in the LAU to an unsuitable condition. Approximately 99 percent of the lynx habitat in the LAU will remain in a suitable condition after harvests, and 18 percent of the LAU will remain as denning habitat. In LAU 3050102, 93 acres of denning habitat and 330 acres of foraging habitat will be treated resulting in the conversion of two percent of the total suitable habitat to an unsuitable condition. Approximately 93 percent of the lynx habitat in the LAU will remain in a suitable condition after harvests, and 28 percent will remain as denning habitat.

2. Young, dense stands of conifer trees provide prime snowshoe hare habitat. As no pre-commercial thinning is proposed, these dense stand types will not be affected by Project activities. Post-harvest fuel treatments will regenerate dense stands of lodgepole pine and be beneficial to snowshoe hares.

3. Proposed treatments will maintain habitat connectivity between LAUs and will not result in any increase in groomed or designated over-the-snow routes and snowmobile play areas in the affected LAUs.

4. Denning lynx will not be impacted by Project treatments as no lynx dens have been documented in the action area.

Bald Eagle

Service concurrence that the proposed action is not likely to adversely affect the bald eagle is based on the following rationales presented in the Assessment.

1. Documented bald eagle use of the Project area is limited to occasional use. No bald eagle nests have been recorded in the action area, and wintering bald eagles generally occupy areas along the lower South Fork Clearwater, downstream of the Project area.

2. Implementation of the proposed action will not result in significant impacts to key bald eagle prey or forage species or increase the risk of eagle mortality.

Gray Wolf

The Service concurs that the proposed action is not likely to jeopardize the continued existence of the gray wolf for the following reasons.

1. There are currently at least 26 breeding wolf pairs in the Central Idaho Wolf Recovery Area (which includes the Project area) and Rocky Mountain wolf population recovery goals have been met or exceeded. Further, no land use restrictions need be employed when six or more breeding pairs have been established in an experimental population area (outside of National Parks and National Refuges) unless wolf populations fail to maintain positive growth rates toward population recovery levels for two consecutive years (59 FR 60265); wolf population numbers are increasing in the Central Idaho Wolf Recovery Area.

2. Harvest activities will not impact any known wolf dens.

3. Implementation of the proposed action will not result in adverse impacts to key wolf prey species (e.g., deer, elk) or increase the risk of wolf mortality.

BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

A. Action Area

The Project area is located approximately three miles southeast of Elk City, Idaho and includes all or portions of sections in T27N, R8, 9, and 10E, Boise Meridian. The Project area includes Forest Service administered lands in 22 subwatersheds within the Red River watershed, Red River Ranger District, Idaho. The action area is defined as all areas to be affected directly or indirectly by the

Federal action and not merely the immediate area involved in the action (i.e., the Project area). Because of potential downstream effects, the action area therefore includes the South Fork Clearwater River from its beginning at the confluence of Red and American Rivers downstream to the Forest Boundary at the Mt. Idaho Bridge.

B. Proposed Action

An outbreak of mountain pine beetle has resulted in extensive mortality of lodgepole pine (*Pinus contorta*) in the Red River watershed. Current overstory lodgepole pine mortality is estimated at 70 to 75 percent. The Forest proposes to conduct vegetation treatments on 3,453 acres in order to remove dead and dying trees, reduce stand densities, reduce ladder fuels, reduce the risk of high intensity fires, and maintain existing fire resistant species in areas where understory is encroaching due to fire suppression. The Project also includes watershed restoration activities.

1. Vegetation Treatments

Treatments will include clearcut (1,541 acres) and shelterwood (1,872 acres) harvests as well as precommercial thinning (42 acres). Other activities associated with vegetation treatments include approximately 18 miles of temporary road construction and 77 miles of road reconditioning (Table 1). Depending upon the characteristics of each harvest unit, the Forest will use cable or tractor yarding; tractor harvesting will only be conducted on slopes less than 35 percent. Post-harvest treatments will include underburning (1,686 acres), broadcast burning (220 acres), and pile burning using excavators (1,505 acres) and hand piling (42 acres).

Table 1. Proposed vegetation treatments and road construction/reconditioning by subwatershed.

Subwatershed	Acres Clearcut	Acres Shelterwood	Acres Precomm. Thin	Miles Temp Road Const	Miles Road Reconditioning
Dawson Creek	0	9.11	0	0.01	1.34
Lower Red River	161	578	41.9	4.77	15.3
Siegel Creek	142	238	0	1.18	9.27
Ditch Creek	0	43.0	0	0.88	0.01
Trail Creek	0	19.6	0	0	5.04
Soda Creek	0	35.0	0	0	1.3
Main Red River	410	581	0	7.33	9.39
Schooner Creek	95.1	36.0	0	0.86	5.00
Trapper Creek	176	0	0	0.71	5.50
Pat Brennan Creek	0	0	0	0	0.68
Lower SF Red River	268	120	0	0.97	6.25
Upper SF Red River	28.0	0	0	0	0.64
Little Moose Creek	40.9	0	0	0.55	1.5
Blanco Creek	95.9	38	0	0.18	4.75
Deadwood Creek	12.6	92	0	0	4.74
Red Horse Creek	33.8	32.7	0	0.23	3.75
French Gulch	14.4	5.8	0	0	0.46
Campbell Creek	13.5	19.4	0	0	0.58
Lowest Red River	49.6	24.2	0	0	1.55
Red River Total	**1541**	**1872**	**41.9**	**17.68**	**77.05**

Project design criteria and mitigation measures will be employed to reduce resource impacts. See Appendix B of this Opinion for a description of relevant criteria and measures.

2. Watershed Restoration

In addition to vegetation treatments, the Forest proposes watershed restoration activities. These include road decommissioning (104 miles), soil restoration (170 acres), inactive mine rehabilitation (41 acres), stream crossing improvements (48 sites), large woody debris placement (37 miles), riparian restoration (36 miles), in-channel restoration (10 miles), and fish structure maintenance (7 miles). Table 2 displays these actions by subwatershed. Appendix A in the Assessment contains details on all proposed watershed improvement activities.

Table 2. Proposed restoration activities by subwatershed.

Subwatershed	Miles Road Decomm	Acres Soil Restoration	Acres Mine Rehab	# Stream Crossing Imprvt.	Miles LWD Placement	Miles Riparian Imprvt.	Miles Structure Maint.	Miles Instream Imprvt.
Dawson Cr	7.82	18.8	10	5	0	0	0	1.5
Lower Red River	18.8	30.4	8.0	7	10.0	3.0	0	3.75
Siegel Cr	0.20	2.5	0	5	2.6	0	0	0
Ditch Cr	5.81	14.6	6.0	0	0.2	0.1	0	0
Trail Cr	2.85	3.4	0	2	0	0	0	0
Baston Cr	0.13	0	0	0	0	0	0	0
Soda Cr	4.72	10.8	0	15	0	0	0	0
Main Red River	14.0	28.3	2.0	2	10.0	20.0	5.0	5.0
Schooner Cr	1.37	5.2	0	1	0.8	0	0	0
Trapper Cr	2.01	2.8	0	0	0	0	0	0
Pat Brennan Cr	2.11	4.6	0	0	0	0	0	0
Lower SF Red R	3.55	3.7	0	2	1.9	1.9	0	0
Upper SF Red R	4.69	2.8	0	1	0	0	0	0
MF Red River	0.53	0	0	0	0	0	0	0
Moose Butte Cr	0.26	1.0	4.0	0	1.8	1.8	1.0	0
Little Moose Cr	11.6	14.4	4.0	4	0	0	0.5	0
Blanco Cr	4.39	7.5	0	1	0	0	0	0
Deadwood Cr	9.95	13.0	4.0	3	1.2	1.2	0	0
Red Horse Cr	0	0	0	0	0	0	0	0
French Gulch	1.21	0	0	0	0	0.7	0	0
Campbell Cr	1.09	1.0	3	0	0	0	0	0
Lowest Red R	6.65	5.4	0	0	7.4	7.4	0	0
Total Red River	**104**	**170**	**41**	**48**	**36.6**	**36.1**	**6.5**	**10.25**

3. Implementation Schedule

Project activities will be scheduled and implemented so that a balance will be achieved between vegetation treatments and watershed improvements. The life of a typical timber sale contract is seven to 10 years, and all required activities will be completed in this time frame. There are three types of restoration activities: 1) road-related activities, mine site reclamation, and riparian plantings that can be completed independently of timber sale actions; 2) road-related activities that are needed for the timber sale activities; and 3) instream and riparian restoration projects, many of which will require planning, designs, permits, and additional funding. Type 1 activities will proceed once the decision is final and can be completed in advance of or concurrently with the vegetation treatments. Type 2 activities will be scheduled with the timber sale actions and coordinated in a way that will not impede either. These could continue through the life of the sale(s) or fuel reduction activities. Much of the in-channel and riparian restoration work (Type 3) requires planning, design work, and permitting. Implementation of Type 3 activities will occur within the timeframe of the timber sale (i.e., seven to 10 years).

Restoration activities will be tracked, including both those completed and those not completed, and reported annually to the Services. If reports indicate that implementation and/or completion of restoration activities lags behind implementation and/or completion of fuel reduction and timber harvest activities, a remedial plan will be developed in coordination with the Services.

4. Monitoring

The Forest will develop a plan in cooperation with the Services to monitor Project implementation and effectiveness of design criteria in reducing resource impacts. Refer to the Assessment for more details on the monitoring plan.

II. STATUS OF THE SPECIES

A. Listing History

On June 10, 1998, the Service issued a final rule listing the Columbia River and Klamath River populations of bull trout as threatened (63 FR 31647) under the authority of the Endangered Species Act (Act). With the listing as threatened of the Jarbidge River population (64 FR 17110, November 1, 1999) and the Coastal-Puget Sound and St. Mary-Belly River populations (64 FR 58910, November 1, 1999), all bull trout in the coterminous United States received full protection under the Act. These five populations listed in the final rule were identified as distinct population segments (DPS).

In recognition of the scientific basis for the identification of bull trout DPSs (i.e., each DPS is unique and significant), the final listing rule specifies that these DPSs will serve as interim recovery units for the purposes of consultation and recovery planning until an approved recovery plan is completed. On that basis, the geographic scope of jeopardy analyses for actions under formal consultation will be at the DPS level as opposed to the entire conterminous United States range of bull trout. This Opinion documents our analysis of effects to the Columbia River DPS of bull trout.

B. Reasons for Listing

Though wide-ranging in parts of Oregon, Washington, Idaho, and Montana, bull trout in the interior Columbia River basin presently occur in only about 45 percent of the historical range (Quigley and Arbelbide 1997; Rieman et al. 1997). Declining trends and associated habitat loss and fragmentation have been documented rangewide (Bond 1992; Schill 1992; Thomas 1992; Ziller 1992; Rieman and McIntyre 1993; Newton and Pribyl 1994; Idaho Department of Fish and Game in litt. 1995). Several local extirpations have been reported, beginning in the 1950s (Rode 1990; Ratliff and Howell 1992; Donald and Alger 1993; Goetz 1994; Newton and Pribyl 1994; Berg and Priest 1995; Light et al. 1996; Buchanan and Gregory 1997; Washington Department of Fish and Wildlife 1997).

The combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced nonnative species (e.g., brook trout, *Salvelinus fontinalis*) have resulted in declines in bull trout distribution and abundance. Land and water management activities such as dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development continue to degrade bull trout habitat and depress bull trout populations (Service 2002).

C. Species Description

Bull trout *(Salvelinus confluentus*), member of the family Salmonidae, are char native to the Pacific Northwest and western Canada. The bull trout and the closely related Dolly Varden (*Salvelinus malma*) were not officially recognized as separate species until 1980 (Robins et al. 1980). Bull trout historically occurred in major river drainages in the Pacific Northwest from the southern limits in the McCloud River in northern California (now extirpated), Klamath River basin of south central Oregon, and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, bull trout current range includes Puget Sound, coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978; Brewin and Brewin 1997). Bull trout are wide-spread throughout the Columbia River basin, including its headwaters in Montana and Canada.

D. Life History

Bull trout exhibit resident and migratory life-history strategies throughout much of the current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the streams where they spawn and rear. Migratory bull trout spawn and rear in streams for one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous), where they reach maturity (Fraley and Shepard 1989; Goetz 1989). Resident and migratory forms often occur together and it is suspected that individual bull trout may give rise to offspring exhibiting both resident and migratory behavior (Rieman and McIntyre 1993).

Bull trout have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear, and that the characteristics are not necessarily ubiquitous throughout these watersheds resulting in patchy distributions even in pristine habitats.

Bull trout are found primarily in colder streams, although individual fish are migratory in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman et al. 1997). Water temperature above 15°C (59°F) is believed to limit bull trout distribution, which may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989; Rieman and McIntyre 1995). Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993; Rieman et al. 1997). Goetz (1989) suggested optimum water temperatures for rearing of about 7 to 8°C (44 to 46°F) and optimum water temperatures for egg incubation of 2 to 4°C (35 to 39°F).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Oliver 1979; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Pratt 1992; Thomas 1992; Rich 1996; Sexauer and James 1997; Watson and Hillman 1997). Jakober (1995) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997).

The size and age of bull trout at maturity depend upon life-history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Fraley and Shepard 1989; Goetz 1989). Bull trout normally reach sexual maturity in 4 to 7 years and live as long as 12 years. Repeat and alternate year spawning has been reported, although repeat spawning frequency and post-spawning mortality are not well known (Leathe and Graham 1982; Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard 1989). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence may exceed 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Bull trout are opportunistic feeders with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton and small fish (Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989; Donald and Alger 1993).

E. Population Dynamics

The draft bull trout Recovery Plan (Service 2002) defined core areas as groups of partially isolated local populations of bull trout with some degree of gene flow occurring between them. Based on this definition, core areas can be considered metapopulations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994). In theory, bull trout metapopulations (core areas) can be composed of two or more local populations, but Rieman and Allendorf (2001) suggest that for a bull trout metapopulation to function effectively, a minimum of between five and 10 local populations are required. Bull trout core areas with fewer than five local populations are at increased risk of local extirpation, core areas with between five and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk (Service 2002).

The presence of a sufficient number of adult spawners is necessary to ensure persistence of bull trout populations. In order to avoid inbreeding depression, it is estimated that a minimum of 100 spawners is required. Inbreeding can result in increased homozygosity of deleterious recessive alleles which can in turn reduce individual fitness and population viability (Whitesel et al. 2004). For persistence in the longer term, adult spawning fish are required in sufficient numbers to reduce the deleterious effects of genetic drift and maintain genetic variation. For bull trout, Rieman and Allendorf (2001) estimate that approximately 1,000 spawning adults within any bull trout population are necessary for maintaining genetic variation indefinitely. Many local bull trout populations individually do not support 1,000 spawners, but this threshold may be met by the presence of smaller interconnected local populations within a core area.

For bull trout populations to remain viable (and recover) natural productivity should be sufficient for the populations to replace themselves from generation to generation. A population that consistently fails to replace itself is at an increased risk of extinction. Since estimates of population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an indicator of a spawning adult population. The direction and magnitude of a trend in an index can be used as a surrogate for growth rate.

Survival of bull trout populations is also dependent upon connectivity among local populations. Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution even in pristine habitats (Rieman and McIntyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth of local populations may be low and probability of extinction high. Migrations also facilitate gene flow among local populations because individuals from different local populations interbreed when some stray and return to non-natal streams. Local populations that are extirpated by catastrophic events may also become reestablished in this manner.

In summary, based on the works of Rieman and McIntyre (1993) and Rieman and Allendorf (2001), the draft bull trout Recovery Plan identified four elements to consider when assessing long-term viability (extinction risk) of bull trout populations: 1) number of local populations, 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population; and 4) connectivity (as represented by the migratory life history form).

F. Status and Distribution

1. Columbia River Distinct Population Segment (DPS)

The Columbia River DPS includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (Quigley and Arbelbide 1997). The Columbia River DPS has declined in overall range and numbers of fish (63 FR 31647).

Although some strongholds still exist with migratory fish present, bull trout generally occur as isolated local populations in headwater lakes or tributaries where the migratory life history form has been lost. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. In Idaho, for example, bull trout have been extirpated from 119 reaches in 28 streams (Idaho Department of Fish and Game in litt. 1995).

Recent literature (Spruell et al. 2003) provides updated information on the genetic population structure of bull trout across the northwestern United States and indicates a need to further evaluate the distinct population structure of bull trout. Based on analysis of four microsatellite loci, Spruell et al. (2003) suggested that there are three major genetically differentiated groups (lineages) of bull trout represented in the Columbia River DPS. They described these as Coastal, Snake River, and Upper Columbia populations. Whitesel et al. (2004) used this and other information to describe four Conservation Units (Upper Columbia, Snake River, Klamath River, and Coastal-Puget Sound) that are thought to represent the best estimate for delineation of areas that are necessary to ensure evolutionary persistence of bull trout.

2. Clearwater River Management Unit

The draft bull trout Recovery Plan (Service 2002) identified 22 recovery units within the Columbia River DPS. These units are now referred to as management units (Service 2004). Management units are groupings of bull trout with historical or current gene flow within them and were designated to place the scope of bull trout recovery on smaller spatial scales than the larger DPS.

Achieving recovery goals within each management unit is critical to recovering the Columbia River DPS. Recovering bull trout in each management unit will maintain the overall distribution of bull trout in their native range. Individual core areas are the foundation of management units and conserving core areas and their habitats within management units preserves the genotypic and phenotypic diversity that will allow bull trout access to diverse habitats and reduce the risk of extinction from stochastic events. The continued survival and recovery of each individual core area is critical to the persistence of management units and their role in the recovery of a DPS (Service 2002).

Bull trout are distributed throughout most of the large rivers and associated tributary systems within the Clearwater River management unit (Clearwater Subbasin Summary 2001) and exhibit adfluvial, fluvial, and resident life history patterns. There are two naturally occurring adfluvial bull trout populations within the Clearwater River management unit; one is associated with Fish Lake in the upper North Fork Clearwater River drainage, and the other is associated with Fish Lake in the Lochsa River drainage (CBBTTAT 1998a, CBBTTAT 1998b). The Bull Trout Recovery Team has identified five core areas and 36 local bull trout populations within the Clearwater management unit (Service 2002, 2004). The core areas include the North Fork Clearwater River, Lochsa River, South Fork Clearwater River, Selway River, and Lower and Middle Fork Clearwater Rivers.

3. South Fork Clearwater River Core Area

Core areas are the building blocks for conserving the bull trout's evolutionary legacy, and are appropriate units of analysis by which threats to bull trout and recovery standards should be measured (70 FR 56258, September 26, 2005). As discussed above, four factors are used to examine the risk of extinction for a core area: number of local populations, adult abundance, productivity, and connectivity. Bull trout are currently known to use spawning and rearing habitat in five stream complexes within the South Fork Clearwater River management unit (i.e., local populations). These local populations include Red River, Crooked River, Newsome Creek, Tenmile Creek and Johns Creek. Because this core area does not have (and is unlikely to achieve) 10 local populations, the core area is at moderate risk of extinction from stochastic events. The loss of one local population in this core area may threaten its long-term viability and recovery. Current abundance and distribution of bull trout in the core area are considered lower than historic levels. It is estimated that there at least 500 spawners present (Service 2002) so this core area is at an intermediate risk of genetic drift. Population trend data is lacking for the core area, so the Recovery Plan determined that until such data is available, the core area is at an increased risk of extinction (Service 2002, 2004). There is an extremely low incidence of fluvial migratory adults in the core area (Forest Service 1999), as well as resident adults (D. Mays, personal communication, January 30, 2006), but migratory bull trout persist in some local populations so the core area is at an intermediate risk of extinction due to loss of connectivity (Service 2002).

Roads, forestry, grazing, residential development, brook trout, and angling threaten bull trout in this core area. Other limiting factors include water temperature, sediment, instream cover, watershed disturbances (includes upland disturbances such as mining, timber harvest, and roading), habitat degradation, exotics/introgression, harvest, and connectivity (Service 2004).

G. Consulted-on Effects within the DPS

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the biological opinions received by the Region 1 and Region 6 Offices, from the time of listing until August 2003; this summed to 137 biological opinions. Of these, 124 biological opinions (91 percent) applied to activities affecting bull trout in the Columbia Basin DPS. The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions that had varying level of effects. Many of the actions resulted in only short-term adverse effects – some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore no actions that have undergone consultation were anticipated to result in the loss of local populations of bull trout.

H. Conservation Needs

Recovery for bull trout will entail reducing threats to the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life-history forms (Service

2002). The draft Bull Trout Recovery Plan identifies the following tasks needed for achieving recovery: 1) protect, restore, and maintain suitable habitat conditions for bull trout;
2) prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout; 3) establish fisheries management goals and objectives compatible with bull trout recovery; 4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout; 5) conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks; 6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats; and 7) assess the implementation of bull trout recovery by management units, and revise management unit plans based on evaluations.

I. Critical Habitat

The Service issued a final rule designating critical habitat for bull trout range wide on September 26, 2005. The designation includes 4,813 miles of stream or shoreline and 143,218 acres of lake or reservoir. We designated areas as critical habitat that 1) have documented bull trout occupancy within the last 20 years, 2) contain features essential to the conservation of the bull trout, 3) are in need of special management, and 4) were not excluded under section 4(b)(2) of the Act. The Final Rule excluded from designation those federally managed areas covered under PACFISH, INFISH, the Interior Columbia Basin Ecosystem Management Project, and the Northwest Forest Plan Aquatic Conservation Strategy. The Service determined that these strategies provide a level of conservation and adequate protection and special management for the primary constituent elements of critical habitat at least comparable to that achieved by designating critical habitat. Areas managed under these strategies do not meet the statutory definition of critical habitat (i.e., areas requiring special management considerations) and were therefore excluded. The excluded areas include much of the proposed critical habitat in Idaho; the final rule only designates 294 miles of stream/shoreline and 50,627 acres of reservoirs or lakes. There is no designated critical habitat for bull trout within the action area.

III. ENVIRONMENTAL BASELINE

The environmental baseline is defined as the current habitat condition including the past and present impacts on bull trout of all Federal, state or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process.

A. Status of the Species in the Action Area

The action area includes portions of the Red River watershed and the South Fork Clearwater River. Bull trout are present in both of these systems.

The draft bull trout Recovery Plan identifies bull trout in the Red River watershed as a local population where spawning and early rearing occur (Service 2002). Various interagency surveys (primarily the Forest and IDFG) have documented bull trout throughout the watershed, but in low densities in almost all reaches (D. Mays, personal communication, January 30, 2006). Red River historically provided highly productive habitat for bull trout in the mid to upper reaches (CBBTTAT 1998c). Forest Service data indicate that bull trout are present in most of the mainstem of Red River and many tributaries. Typical bull trout densities found during Forest Service surveys were generally less than 0.1 fish per 100 square meters, with a maximum recorded density of 1.97 fish per 100 square meters. Surveys conducted by the Forest in 2000 and 2001 located three bull trout in the upper reaches of the South Fork Red River. Additional surveys conducted by the Forest in 2001 located a previously unknown concentration of bull trout in the Red River watershed by documenting 43 bull trout, ranging in length from 35 to 280 millimeters (1.4 to 11 inches), in an 800 meter section of the West Fork of the South Fork Red River (Service 2002).

A survey conducted by Idaho Department of Fish and Game (IDFG) in 1993 measured 0.75 bull trout per 100 meters in the Red River watershed (CBBTTAT 1998c). Surveys of the South Fork Red River by IDFG in 1995 indicated densities of 0.15 and 0.08 bull trout per 100 square meters in the West Fork of the South Fork and the Middle Fork Red River respectively. A survey of Red River tributaries in 1997 documented a single bull trout in each of five tributaries: Baston Creek, Bridge Creek, Dawson Creek, Siegel Creek, and Soda Creek (Olson and Brostrom 1997).

Both fluvial and resident bull trout are present in the Red River watershed, although the numbers of both life history forms are likely substantially reduced compared with historical estimates. Connectivity is currently limited in Red River because of habitat degradation in the mainstem and tributaries. The population status of bull trout is considered weak/depressed throughout the known use area within the watershed. The Forest has characterized the Red River local population as stable or fluctuating in a downward trend with population strongholds located in the South Fork, Middle Fork, West Fork, and upper Main Red River. Current (since 1985) spawning and early rearing is known to occur in upper and mainstem Red River, Lower and Upper South Fork Red River, Middle and West Fork of the South Fork Red River, Moose Butte, Dawson, Baston, Bridge, and Trapper Creeks (Service 2002, 2004). Total population numbers in the whole watershed are estimated to be less than 500 but greater than 50 (Forest Service 2005). Based on the best available information, bull trout use for each of the subwatersheds in the action area is shown in Tables 3, 4, and 5.

The South Fork Clearwater River provides feeding, migrating, and overwintering habitat for bull trout and connectivity between potential local populations and existing local populations in the core area; bull trout spawning has not been documented. Biologists estimate that there has been a significant loss of fluvial bull trout and associated subadult/adult rearing habitats throughout the South Fork Clearwater drainage (Forest Service 2003a).

B. Factors Affecting the Species in the Action Area

As previously described in the Status of the Species section of this Opinion, bull trout distribution, abundance, and habitat quality have declined range wide primarily from the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest, poaching, entrainment, and introduced non-native fish species.

1. Red River

Past and present factors affecting the species within the action area include extensive in-channel dredge mining, roading, and timber harvest on National Forest and private lands. Timber harvest and associated road building have posed the greatest risk to bull trout in the Red River drainage (Service 2002). Because of the large amount of harvest overall, particularly harvest in streamside and landslide-prone areas, the Clearwater Basin Bull Trout Technical Advisory Team rated the impact of timber harvest in the Red River drainage as high (CBBTTAT 1998c). Twenty-two percent of the land base in Red River has been subject to timber harvest activities, including timber harvest in 15 percent of the streamside areas and road encroachment into riparian areas and streams (CBBTTAT 1998c). The extent and magnitude of these activities have resulted in degraded baseline conditions for bull trout habitat in the action area. Watershed and habitat condition indicators rated as being in low condition in the Red River watershed include Watershed Road Density, Streamside Road Density, Landslide Prone Road Density, Sediment Yield, Cobble Embeddedness, and Pool Frequency. All other indicators are rated as moderate except Water Yield/ECA, which is rated as high (Forest Service 2005).

To determine habitat and watershed condition in each affected subwatershed within the Red River watershed, we looked at cobble embeddedness, sediment yield, watershed road density, and water yield (using equivalent clearcut area (ECA) as a surrogate). The Assessment and Red River Ecosystem Analysis at the Watershed Scale (Forest Service 2003a) provide values for these indicators. We used the Matrix of Pathways and Indicators of Watershed Condition (NMFS 1996) to rate each of the selected indicators in each subwatersheds as being in High, Moderate, or Low watershed condition. We then assigned a score to each watershed by totaling values for each indicator (Low = 1, Moderate = 2, and High = 3). The values and scores are shown in Appendix A of this Opinion.

Conditions in all Red River subwatersheds with proposed actions have been degraded to a greater or lesser extent. Nevertheless, of the various subwatersheds in the action area some are in better condition than others. The relative habitat condition for the subwatersheds in the action area will be important to consider when assessing risk to bull trout from Project activities. Using cluster analysis (SAS JMP v. 5), we grouped the subwatersheds into high, moderate, and low relative condition based on the total scores for the four habitat indicators. These groupings are shown in Tables 3, 4, and 5 respectively. These tables also include information for each subwatershed on ecological reporting unit, bull trout use, other habitat concerns, and brook trout presence.

As displayed in Table 3, bull trout are present in five of the six streams (83 percent) and spawning and early rearing[1] have been documented in three streams (50 percent) rated as being in a high watershed condition (i.e., relative condition compared to the rest of the subbasins in Red River). Spawning streams are the Middle Fork Red River, Upper South Fork Red River (both located in the

[1] Actual bull trout redds or spawning behavior have not been documented in the Red River watershed by the Forest or Idaho Department of Fish and Game (D.Mays, Nez Perce National Forerst, personal communication, 2006). However, the Service assumes that spawning is occurring wherever early rearing (ages 0 and 1) bull trout are documented. Streams with documented early rearing bull trout will be designated in this Opinion as Spawning and Early Rearing (SR) areas and follows the delineation of these areas as provided n the draft bull trout Recovery Plan (Service 2002, 2004) and South Fork Clearwater River Subbasin Bull Trout Problem Assessment (CBBTTAT 1998c).

South Fork Red River ERU) and Baston Creek (located in the Upper Red River ERU). Bull trout are absent from one stream (17 percent) - Trail Creek. Watershed/Habitat condition scores for this group averaged 8.2.

Table 3. Subwatersheds ranked as high condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information.

Subwatershed	Watershed/ Habitat Condition Score	Ecological Reporting Unit	Bull Trout Use	Other Concerns	Brook Trout Present
MF Red River	9	SF Red River	SR		Y
Red Horse Creek	8	Lower Red River	FMO	Temp	Y+
Upper SF Red River	8	SF Red River	SR	LWD	Y
Trapper Creek	8	SF Red River	FMO	LWD	Y+
Baston Creek	8	Upper Red River	SR		Y
Trail Creek	8	Upper Red River	PA		Y+

Table 4. Subwatersheds ranked as moderate condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use are shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information.

Subwatershed	Watershed/ Habitat Condition Score	Ecological Reporting Unit	Bull Trout Use	Other Concerns	Brook Trout Present
French Gulch	7	Lower Red	PA	Mining	
Lower SF Red River	7	SF Red River	SR	Temp, LWD, SSR	Y
Pat Brennan	7	SF Red River	PA		
Main Red R.	7		FMO	Temp, LWD,	Y
Lowest Red R.	6	Lower Red River	FMO	Temp	Y
Campbell Cr.	6	Lower Red River	PA		
Moose Butte Cr.	6	Middle Red River	FMO	Temp, SSR, SSH	Y+
Schooner Cr.	6	SF Red River	PA		
Soda Cr.	6	Upper Red River	FMO		Y+
Ditch Cr.	6	Upper Red River	FMO	SSR	
Siegel Cr.	6	Lower Red River	FMO	Temp	Y+
Lower Red R.	6	Middle Red River	FMO	Temp, Mining, SSR,	Y

Table 4 shows that of the 12 streams rated as being in moderate relative condition, bull trout are present in eight (67 percent) and spawning and early rearing is documented in one (8 percent). Bull trout are presumed absent from four out of the twelve (33 percent) subwatersheds. Habitat scores for this group average 6.3.

Table 5. Subwatersheds ranked as low condition based on Watershed/Habitat Condition Score, which includes cobble embeddedness, road density, water yield, and sediment yield. Score and Bull Trout Use are shown. For bull trout use, SR = Spawning and early rearing, FMO = Feeding, Migrating, and Overwintering, and PA = Probably Absent. For other concerns: Temp = water temperature, LWD = large woody debris, SSR = streamside road density > 1 mi/sq. mi., SSH = streamside harvest > 10 percent of RHCA area. For Brook Trout presence: Y = Yes, Y+ = spawning, and Blank = no information.

Subwatershed	Watershed/ Habitat Condition Score	Ecological Reporting Unit	Bull Trout Use	Other Concerns	Brook Trout Present
Deadwood Cr.	5	Lower Red River	PA	Mining, SSR, SSH	
Little Moose Cr.	5	Middle Red River	FMO	Mining, SSR, SSH	
Blanco Cr.	5	Middle Red River	PA	Mining, SSR, SSH	
Dawson Cr.	4	Middle Red River	FMO		Y

Bull trout spawning and early rearing have not been documented in any of the four subwatersheds rated as being in relatively low condition, and in 50 percent of the subwatersheds, bull trout are presumed absent (Table 5). Habitat scores for this group average 4.8.

Not surprisingly, bull trout, a species associated with relatively pristine habitat conditions, are found (and spawn) in more streams rated as being in relatively high condition within the Red River watershed. However even these streams as previously mentioned have suffered some degree of degradation, and only have an average habitat condition score of 8.2 out of a maximum possible score of 12, based on baseline condition for cobble embeddedness, sediment yield, watershed road density, and water yield (using equivalent clearcut area as a surrogate).

2. South Fork Clearwater River

Because of potential downstream sediment routing effects from Project activities, the South Fork Clearwater River, extending downstream from the confluence of American River and Red River to the Forest boundary, is considered part of the action area for this Project.

Land and water management activities that depress bull trout populations and degrade habitat include dams and other water diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development. Although dam construction and urban development are not factors within the action area, they have occurred on the mainstem South Fork Clearwater River downstream of the action area and have impacted bull trout food resources (through reductions in salmon abundance) and connectivity with other core areas (Dechert et al. 2004). Timber harvest and historic dredge mining activities in the South Fork Clearwater core area have been extensive with resulting impacts to bull trout and bull trout habitat.

Historic mining has affected portions of the mainstem South Fork Clearwater, particularly in the upper watershed. There have been moderate to high levels of timber harvest with approximately 3,300 acres of RHCA harvest. Watershed road density averages 3.51 miles per square mile and streamside road density averages 4.36 miles per square mile giving the watershed a low rating for these indicators. Peak/base flow, water yield (ECA), temperature, and cobble embeddedness indicators are also rated as low. Sediment yield is rated as moderate. The Idaho Department of Environmental Quality considers the South Fork Clearwater River as water quality limited (303(d) listed) from its headwaters to its mouth (Dechert et al. 2004).

C. Status Summary

Current distribution of bull trout within the Red River watershed is thought to be similar to the historic distribution but with substantially lower population numbers and the significant reduction of the fluvial component of the population. Population status is characterized as weak or depressed throughout the majority of the watershed. Strongest existing population areas appear to be the West/Middle/Upper South Fork Red River, and possibly Upper Red River and surrounding tributaries. Genetic integrity of the bull trout population in the watershed is unknown due to the substantial overlap with brook trout distribution and associated potential interbreeding. Significant reduction of the fluvial component may also have reduced genetic integrity by limiting genetic exchange between local populations (Forest Service 2003a).

Upland disturbance activity (predominately roading and timber harvest) has substantially degraded bull trout habitat in the Red River watershed. Upland disturbance combined with historic dredge mining has greatly reduced connectivity (through reduction in habitat quality) between bull trout both within the Red River watershed and between Red River and surrounding watersheds (Forest Service 2003a).

The Service concludes that bull trout, a species requiring relatively pristine habitat conditions, are in general exposed to suboptimal habitats in the action area primarily as a result of past and on-going human activities, and population numbers are reduced from historic levels.

The Red River local population may be at a high risk of extinction due to a number of factors including habitat degradation, low number of individuals, presence of brook trout, and depressed numbers of migratory adults. Factors that may reduce extinction risk include the presence (although reduced) of physical connectivity with other local populations in the core area and the presence of population strongholds within the local population in the upper watershed, specifically the South Fork/Middle Fork and Upper Red River basins.

al. 1991). Canopy removal also alters the amount, frequency, and intensity of precipitation delivered to forest floors (Troendle and Olsen 1993). These disturbances may also lead to increased amounts of sediment introduced into streams and mobilization of sediments within the stream channel, mediated again by local conditions.

Bull trout are sensitive to hydrologic and sediment regime alterations due primarily to the extended period of time from egg deposition to fry emergence spent within the streambed (Polacek and James 2003). Hydrologic changes that alter normal bedload movement and scour and fill patterns can excavate or bury redds, exposing eggs to stream flow, and trapping or crushing eggs or fry.

Increasing levels of fine sediments affect developing eggs by filling interstitial spaces within stream substrate, thereby reducing or eliminating 1) water flow through the redd and supply of oxygen to developing eggs, 2) removal of waste products, and 3) the ability of juvenile fish to emerge from the redd. Because of the extended residency of bull trout in interstitial substrate spaces (220+ days from egg deposition to emergence), eggs, alevins, and fry are highly vulnerable to the impacts resulting from the deposition of fine sediments. Increased levels of fine sediment can also affect important components of bull trout habitat such as the number and quality of available pools (Lisle and Hilton 1992).

Bull trout require colder water temperatures than most salmonids and these requirements vary by life cycle stage. Timber harvest has the potential to affect stream temperatures primarily through reducing streamside canopy levels (Kishi et al. 2004). The potential for riparian vegetation to moderate stream temperatures is greatest for small to intermediate size streams and diminishes as stream size increases (Spence et al. 1996). Generally, small and intermediate streams represent the majority of total aggregate stream length within a watershed (Chamberlin et al. 1991). Given these relationships, maintaining adequate canopy conditions on small and medium sized streams (including intermittent streams) is necessary to avoid altering natural temperature regimes.

Groundwater entering streams may be an important determinant of stream temperatures and may provide localized thermal refugia or spawning areas for bull trout. Baxter et al. (1999), for example, found a positive correlation between numbers of bull trout redds and areas of ground water exchange in the Swan River Basin, Montana. Timber harvest from upland areas exposes the soil surface to greater amounts of solar radiation than under forested conditions, and where groundwater flows originate above a neutral temperature zone, where temperatures remain constant throughout the year, fluctuations in groundwater temperature can be expected. Fluctuations will be greatest at the soil surface and will decrease with increasing depth until the neutral zone is reached (Spence et al. 1996). Increases in groundwater temperature may result in increases in stream temperature, especially in small streams dependent upon lateral groundwater input to maintain flows during base flow periods (Spence et al. 1996, Brosofske et al. 1997, Poole and Berman 2001). Because of increased surface area exposure, potential effects to ground water and stream temperature are expected to be greater in areas that are clearcut.

The Forest proposes 1,541 acres of clearcut treatment and 1,872 acres of shelterwood harvest. The distribution of these types of harvest by subwatershed is displayed in Table 6. Of the four designated bull trout spawning and early rearing areas in the action area, no vegetation treatments are proposed in Middle Fork Red River and Baston Creek. Only 28 acres of harvest are proposed in

Table 6. Acres and type of vegetation treatment and yarding system by subwatershed. Habitat condition and bull trout use are also shown. For bull trout use (BT), SR = spawning and early rearing, and FMO = feeding, migrating and overwintering

Subwatershed	Condition	BT Use	Clear cut Acres	Shelterwood Acres	Precommercial Thin Acres	Cable Yarding Acres	Ground Based Yarding Acres	Total Acres
MF Red River	H	SR	0	0	0	0	0	0
Red Horse Creek	H	FMO	34	33	0	24	42	133
Upper SF Red River	H	SR	28	0	0	12	16	56
Trapper Creek	H	FMO	176	0	0	156	19	351
Baston Creek	H	SR	0	0	0	0	0	0
Lower SF Red River	M	SR	268	120	0	247	141	776
Main Red R.	M	FMO	410	581	0	388	602	1981
Lowest Red R.	M	FMO	50	24	0	24	50	148
Moose Butte Cr.	M	FMO	0	0	0	0	0	0
Soda Cr.	M	FMO	0	35	0	20	14	69
Ditch Cr.	M	FMO	0	43	0	16	27	86
Siegel Cr.	M	FMO	142	238	0	164	216	760
Lower Red R.	M	FMO	161	578	42	574	165	1520
Little Moose Cr.	L	FMO	41	0	0	30	11	82
Dawson Cr.	L	FMO	0	9	0	9	0	18

Upper South Fork Red River. Bull trout in the Lower South Fork Red River are most at risk from harvest treatments. A total of 388 acres of harvest (including 268 acres of clearcut) and 141 acres of tractor yarding are proposed in this subwatershed, a subwatershed that is in moderate relative habitat condition. The remaining harvest is in watersheds that provide FMO habitat for bull trout. Most of the proposed harvest activity is located in subwatersheds rated as moderate condition. For the most part subwatersheds of relative high condition have very little proposed treatment. Similarly, the most degraded subwatersheds, Little Moose and Dawson, have very little proposed treatment.

Project design criteria expected to reduce the risks of negative impacts on bull trout from timber harvest include no vegetation treatments in streamside RHCAs (PDC #4), restricting tractor harvesting to slopes less than 35 percent (PDC #9), and prohibiting timber harvest or road construction in areas of high landslide hazard (PDC #6).

b. Fire/Fuels Management

Units harvested using cable yarding will be broadcast burned or underburned (Table 7). Depending on fire intensity, broadcast burn treatments of harvest slash can increase erosion and sediment delivery, alter water yield, and timing of peak and low flows (Spence et al. 1996). Robichaud (2000) reports infiltration rates for undisturbed forests as being in general high and that the amount of

Table 7. Burning prescription and slash piling method by subwatershed. Also shown are habitat condition (H = high, M = moderate, and L = low) and bull trout habitat use (SR = spawning and early rearing, and FMO = feeding, migrating, and overwintering).

Subwatershed	Condition	BT Use	Underburn (acres)	Broadcast Burn (acres)	Excavator Pile (acres)	Hand Pile (acres)	Total Slash Treatment (acres)
MF Red River	H	SR	0	0	0	0	0
Red Horse Creek	H	FMO	24	0	42	0	66
Upper SF Red River	H	SR	28	0	0	0	28
Trapper Creek	H	FMO	157	0	19	0	176
Baston Creek	H	SR	0	0	0	0	0
Lower SF Red River	M	SR	279	0	109	0	388
Main Red R.	M	FMO	337	51	602	0	990
Lowest Red R.	M	FMO	24	0	50	0	74
Moose Butte Cr.	M	SR	0	0	0	0	0
Soda Cr.	M	FMO	20	0	14	0	34
Ditch Cr.	M	FMO	16	0	27	0	43
Siegel Cr.	M	FMO	183	10	187	0	380
Lower Red R.	M	FMO	508	73	158	42	781
Little Moose Cr.	L	FMO	0	30	11	0	41
Dawson Cr.	L	FMO	9	0	0	0	9

disturbance to the forest floor (i.e., duff layer) is the major factor in determining the intensity of runoff from burn and harvest treatments. Fire can remove the protective duff layer and depending upon severity of burn can create hydrophobic soil conditions which in turn can increase overland flow during precipitation events. Overland flow, by detaching and transporting sediment, results in increased erosion and may, depending upon fire severity, intensity of precipitation, and landscape characteristics, initiate debris flows and mass wasting (Wondzell and King 2003).

Thus post-fire erosion may result in an increase of nutrients and fine sediment into streams with potential adverse effects to stream substrates, channel morphology (e.g., reduction in quality and quantity of pools), and bull trout early life stages (i.e., eggs, alevins, fry, and juveniles).

In addition, like timber harvest, fire treatments in RHCAs, if severe enough, can remove coarse wood through incineration and reduce canopy cover. These impacts can lead to reduced habitat complexity and increased stream temperature, habitat elements that are extremely important to bull trout. Although fires will not be ignited in RHCAs in the Project area, they will be allowed to back (i.e., burn) into RHCAs (PDC #5). This method of introducing fire into RHCAs purportedly results in a low intensity burn with minimal impacts on vegetation and soil.

Slash in tractor yarded harvest units will be piled and burned (Table 7). Machine piling slash can result in soil compaction, disturbance, and erosion with potential increases in sediment delivery to bull trout habitat. Pile burning can result in fire intensities that damage soils under the piles (Poff 1996), and leave persistent, unvegetated scars. Korb et al. (2004) found that slash pile burning alters soil properties, destroys plant seeds and mycorrhizae fungi, and because these burn scars remain unvegetated they were vulnerable to invasions by non-native (including noxious) plant species. Invasive non-native plants can displace native species and alter ecosystem functions (Tu et al. 2001). Both preventative and control measures are required to address these threats. Once populations of invasive plants are established, the use of herbicides is often the most effective available control method. Herbicides, however, may have adverse effects on bull trout and their use should be minimized by taking preventative measures against the initial establishment of invasive plant populations. Korb et al. (2004) identify revegetating disturbed areas, such as burn pile scars, with native species as one such preventative measure.

If fire suppression is needed, the use of chemical fire retardants may adversely impact bull trout. Retardants can have direct and indirect effects on salmonids. Large quantities of retardant delivered directly into streams can cause direct mortality. Indirect effects of retardants delivered directly into streams include mortality of invertebrates and eutrophication of downstream reaches (Spence et al. 1996).

Of the designated bull trout spawning areas, Lower South Fork Red River will be most affected by slash treatments with 109 acres of machine piling and burning and 279 acres of underburning. Of the FMO subwatersheds, Main Red River, Lower Red River, and Siegel Creeks have the largest amount of slash treatment.

2. Road Construction and Maintenance

The Project includes approximately 18 miles of temporary road construction and 77 miles of road reconditioning displayed by subwatershed in Table 8. Gucinski et al. (2001) indicate that there may be fewer direct adverse effects to aquatic species from temporary roads compared to permanent roads, but this difference is dependent upon the degree of temporary road decommissioning. Additionally, the indirect effects from temporary roads include the effects from the activities for which the roads were built, such as sediment production from timber harvest. Potyondy et al. (1991) indicate that the majority of surface erosion associated with road construction in general (whether temporary or permanent) occurs in the first year and continues at a reduced but relatively high rate for several years, depending upon local weather conditions. The Project calls for building and decommissioning temporary roads within a one to three year period (PDC #12). To minimize sediment effects, new temporary roads will be constructed using minimal road widths and out-sloped surface drainage (PDC #13).

No road construction will occur in high landslide prone areas (PDC #6). These measures should minimize but not eliminate the potential for sediment delivery and adverse effects to bull trout from temporary road construction.

Road reconditioning involves general road maintenance on an existing road and may include upgrades or establishment of stream crossing and drainage structures, cut and fillslope stabilization, addition of surface material, removal of vegetation and debris, and other activities needed to prepare a road for use by log trucks.

Although not specified in the Assessment, it is assumed that road reconditioning will include both heavy and light reconstruction with significant surface erosion expected. As with temporary road construction, surface erosion resulting from road reconditioning will be highest in the first year after the improvement activity (although at a reduced rate compared to new road construction) and will continue at a lower rate during subsequent years. The amount of erosion during subsequent years is dependent upon the intensity of use or upon whether the road is closed or decommissioned (Potyondy et al. 1991). Similarly, Luce and Black (2001) identified road maintenance and vehicle traffic as primary factors affecting forest road sediment production. Increased surface erosion and sediment delivery to bull trout habitat has the potential to affect bull trout through the pathways described in the sections above. Adverse effects may be reduced by the use of sediment and erosion control measures such as dewatering culverts, using sediment barriers, and rocking road surfaces and ditches (PDC #17).

When miles of temporary road construction and road reconditioning are totaled (approximate totals in parentheses), Lower Red River (20), Main Red River (17), and Siegel Creek (10) have the highest amount of activity and potentially significant increases in sediment yield (Table 8). These subwatersheds provide FMO habitat for bull trout. Of the four subwatersheds designated as spawning and early rearing habitat, Middle Fork Red River and Baston Creek will have no Project related road work. Upper South Fork Red River will have less than one mile of road work. Lower South Fork Red River has approximately seven miles of road work proposed, potentially resulting in an increased risk to bull trout from road related sediment effects (however this total only includes one mile of temporary road construction, the rest is road reconditioning).

Table 8. Miles of temporary road construction, road reconditioning , total miles of road work by subwatershed. Also shown are habitat condition (H = high, M = moderate, and L = low) and bull trout habitat use (SR = spawning and early rearing, and FMO = feeding, migrating, and overwintering).

Subwatershed	Condition	BT Use	Miles Temp Rd Construction	Miles Road Reconditioning	Total Road Work
MF Red River	H	SR	0	0	0
Red Horse Creek	H	FMO	.23	3.75	4
Upper SF Red River	H	SR	0	.64	1
Trapper Creek	H	FMO	.71	5.5	6
Baston Creek	H	SR	0	0	0
Lower SF Red River	M	SR	.97	6.25	7
Main Red R.	M	FMO	7.33	9.39	17
Lowest Red R.	M	FMO	0	1.55	2
Moose Butte Cr.	M	FMO	0	0	0
Soda Cr.	M	FMO	0	1.3	1
Ditch Cr.	M	FMO	.88	.01	1
Siegel Cr.	M	FMO	1.18	9.27	10
Lower Red R.	M	FMO	4.77	15.3	20
Little Moose Cr.	L	FMO	.55	1.5	2
Dawson Cr.	L	FMO	.01	1.34	1

3. Watershed Improvements/Restoration

In addition to vegetation treatments, the Forest proposes watershed restoration activities. These include road decommissioning (104 miles), stream crossing improvements (48 sites), large woody debris placement (37 miles), riparian restoration (36 miles), in-channel restoration (10 miles), fish structure maintenance (7 miles), soil restoration (170 acres), and inactive mine rehabilitation (41 acres). Appendix C of this Opinion displays these actions by subwatershed along with habitat quality and bull trout use. Appendix A in the Assessment contains details on all proposed watershed improvement activities.

a. Road decommissioning

Road decommissioning will include a range of actions from abandonment to recontouring with a range of potential impact severities. Road decommissioning can be expected to result in some sediment inputs into aquatic systems (Madej 2001) with potential downstream effects to bull trout and bull trout habitat, and erosion from decommissioned roads will continue at higher than natural rates for several years (Potyondy et al., 1991).

b. Stream crossing improvements

Stream crossing improvements will be done to improve upstream passage for aquatic organisms as well as for reducing the risk of culvert failure during high-flow events. Improvements will consist of a range of actions including installing baffles in culverts, replacing undersized culverts with larger culverts or bridges, and culvert removal and ford hardening. Stream crossing upgrades can result in a short-term increase in the delivery of fine sediment and both directly and indirectly adversely affect bull trout. Up to 2 tons of sediment can be introduced into streams from a single culvert replacement (Forest Service 2003b) and downstream suspended sediment concentrations can reach levels of 2,000 mg/liter for three hours (Bakke et al. 2002). Depending upon concentration and duration of exposure, suspended sediment may directly affect bull trout physiological condition and behavior (Newcombe and Jensen 1996, Bash et al. 2001). Newcombe and Jensen (1996) predict sublethal adverse effects are expected for juvenile and adult salmonids at suspended sediment concentrations as low as 55 mg/l at exposure times of three hours. This level of exposure may produce short-term reductions in feeding rates and feeding success, and minor physiological stress. Compared with other salmonids, bull trout are more sensitive to sediment and require the lowest suspended sediment levels (Bash et al. 2001). The Service anticipates that bull trout present at stream crossing improvement sites may be adversely affected by exposure to suspended sediment concentrations exceeding 55 mg/l for durations of three hours or more and potentially higher levels for shorter durations.

Indirectly, high concentrations of suspended sediment may affect survival, growth, and behavior of stream biota upon which bull trout feed (Harvey and Lisle 1998). Deposited sediment may affect bull trout as described in the above sections addressing sediment effects.

Other potential adverse effects to bull trout may result from the introduction of toxic fuels, lubricants, coolants, or hydraulic fluids into the stream through accidental spills or equipment leaks.

Concrete may be required for culvert or bridge footings. Washout water from cleaning concrete equipment and tools may also be toxic to bull trout because of its very high alkalinity.

Finally, electrofishing may be used at stream crossing improvement sites to remove fish from the work area with potentially lethal and sublethal effects to bull trout (Nielsen 1998).

Even after upgrading a stream crossing, if a detailed geomorphological evaluation of the site was not completed prior to commencing work, channel incision can occur and migrate upstream (Castro 2003). Channel incision results in loss of habitat, increased turbidity and finally may create a new fish passage barrier at an existing culvert (Castro 2003). It is also important to consider that improving fish passage may have unintended negative consequences by enabling exotic species such as brook trout to access and potentially impact (through hybridization and competition) isolated bull trout populations (Gunckel et al. 2002, Naohisa et al. 2002, Rich et al. 2003).

c. In-channel reconstruction

This work (proposed in Lower Red River, Little Moose Creek and Dawson Creek) will include stream channel realignment, reestablishment of flood plain connectivity, large woody debris placement, and planting riparian vegetation and removing sediment traps. Adverse effects to bull trout from instream activities include direct and indirect sediment effects (deposition and turbidity) as well as direct disturbance of fish in the immediate vicinity of instream work. Instream work may involve the use motorized equipment and lubricant or fuel leaks may result in toxic effects to bull trout.

d. Sediment trap decommissioning, fish structure maintenance, large woody debris placement

These restoration actions have the potential to affect bull trout by increasing suspended sediment levels, disturbance, and lubricant or fuel leaks as described in the above sections.

e. Soil restoration

Soil restoration activities will include road recontouring, soil decompaction, replacing surface soil and organic material, and restoring erosion features such as rills and gullies. An insignificant short-term increase in sediment delivery is expected. Similar short-term sediment effects are expected from mine site reclamation and recreation and trail improvements, although overall short and long-term beneficial effects are expected from these activities.

f. Design criteria

Design criteria to reduce the risk of adverse effects to bull trout from watershed restoration include the use of flow diversions and sediment barriers to minimize sediment delivery to streams (PDC #17); conducting work during the instream work window (July 1 to August 15) to avoid effects to spawning fish (PDC #18); designing stream crossings to approximate the natural channel and accommodate passage of streamflow, debris, and aquatic organisms (PDC #19); and using electrofishing (following NOAA fisheries 1998 guidelines) or other means to remove bull trout from instream activity sites (MM-A). As previously noted, bull trout may be injured or killed in the process of collecting and removing them from the instream work sites. The use of electrofishing or other methods to remove bull trout from these sites requires that the Forest possess a current Scientific Collecting Permit issued by Idaho Department of Fish and Game, and follow all associated requirements. The Service has already analyzed the effect of work conducted under the Department's permits in a February 2000 intra-Service Biological Opinion (Service 2000).

Although these criteria are expected to reduce many potential impacts to bull trout they will not eliminate all effects. For example, Rashin et al. (1999) found that best management practices employed for new road crossings in western Washington were generally ineffective at preventing erosion of culvert fills. Additionally, to be most effective, planning for restoration actions should be based on the results of watershed assessments. Some degree of assessment should be conducted for all projects in order to identify the basic causes of degraded habitat conditions. Restoration projects addressing the causes of degraded habitat, not just the symptoms, will not only help ensure long-term success of the projects but will help avoid the risk of unintended negative habitat and infrastructure impacts (Saldi-Caromile et al. 2004). The Forest has completed a watershed assessment for Red River (Forest Service 2003a).

4. Project Effects Summary

The Assessment predicts that the only indicators from the Matrix of Pathways and Indicators to be significantly affected in the short-term are Watershed Road Density, Sediment Yield, Suspended Sediment, Cobble Embeddedness, and Harassment. Temporary road construction will increase road density for three years at most prior to their removal, but road decommissioning will reduce density in both the short- and long-terms. Harassment of bull trout may result from the presence of equipment and personnel instream during restoration projects. No significant negative impacts are expected for large woody debris, number and quality of pools, water temperature, or any other indicators. The Project is expected to result in short-term increases in sediment yield in many subwatersheds but with a long-term decline in yield in most subwatersheds. No significant increase in sediment yield is predicted for the South Fork Clearwater River.

At the landscape level, sediment yield is the movement of sediment from landscape to stream system. In a stream system, sediment yield is defined as the movement of sediment past a point in the stream system over a certain period of time and is expressed as percent over natural base. Sediment yield can be sampled in the field using a variety of methods such as sampling suspended sediment, bedload movement, and stream discharge (Forest Service 2005b). The Forest uses NEZSED to model sediment yield. The NEZSED computer model is an adaptation of the Forest Service R1/R4 sediment yield guide (Cline et al. 1981). NEZSED accounts for natural background sediment and activity sediment generated from roads, timber harvest, and fire. The activity sediment is estimated from surface erosion processes and small mass failures. NEZSED cannot account for sediment produced from soil restoration actions, trail construction or maintenance, and stream channel restoration activities. NEZSED also does not consider the effects of mass erosion events greater than 10 cubic yards.

NEZSED modeling predicts peaks in sediment yield during the first year of implementation and gradual declines to pre-Project levels within several years. However, the modeled decline in sediment yield may be overly optimistic. Perry (1998) cites studies showing suspended sediment resulting from a watershed that was 25 percent clearcut, broadcast burned, and roaded as being 57 times greater per year than a control unroaded, uncut watershed, eleven years after treatment. Perry does not specify whether these roads are permanent or temporary although in the short-term the difference in sediment inputs may not be significant. As discussed above, Potyondy et al. (1991) indicate that the majority of surface erosion associated with road construction in general (whether temporary or permanent) occurs in the first year after construction and continues at a reduced but relatively high rate for several years.

The R1/R4 Guide cautions that model results are intended primarily for comparing management alternatives and only secondarily for quantifying sediment yield. Gloss' study (1995) concluded that the NEZSED model cannot be expected to provide highly accurate sediment yield estimates.

Given these limitations, the NEZSED model predicts that during the first year of implementation sediment yield is predicted to increase in the following bull trout streams within the action area: Lower Red River, Siegel Creek, Main Red River, Lower South Fork Red River, Little Moose Creek, Red Horse, and Lowest Red River (Forest Service 2005a). Of these streams only Lower South Fork is designated as a spawning and early rearing area. The other subwatersheds are considered FMO habitat.

A stream can transport a limited volume of sediment if it is in equilibrium, that is the channel is neither aggrading nor degrading (Lisle and Hilton 1992). If volume of sediment exceeds the amount that can be transported sediment settles to the channel bottom of depositional reaches with resulting potential impacts to aquatic organisms and habitat (e.g., substrate condition, pool habitat, and water temperature). The Forest uses FISHSED to model the effect of sediment yield on fish abundance. A basic assumption of the FISHSED model is that increased levels of deposited sediment reduce fish survival and abundance (modeled as winter and summer rearing capacity). All Project watersheds currently have high levels of cobble embeddedness and the FISHSED model predicts slight increases in embeddedness and decreases in summer and winter rearing capacity as a result of Project implementation. FISHSED is most useful in assessing effects of substantial changes in habitat quality greater than 10 percent. Summer rearing capacity is not expected to change significantly in any subwatershed. The only bull trout subwatershed where predicted changes in winter rearing capacity exceed 10 percent is Lower Red River. This subwatershed is considered FMO habitat.

In summary bull trout may be directly affected by elevated suspended sediment levels and disturbance associated with in-channel restoration actions. Bull trout may be indirectly affected by temporary increases in peak sediment yield that may result in decreased winter rearing habitat for both bull trout and their prey species (juvenile steelhead and chinook salmon). As previously discussed, a slight reduction in winter rearing habitat carrying capacity is possible in Lower Red River. Lower Red River is not considered bull trout spawning habitat.

Within the Red River watershed as a whole, the Project is expected to result in long-term improvement in habitat conditions for bull trout (Forest Service 2005a). Implementation of watershed restoration activities, particularly road decommissioning and upgrades of stream crossings, is expected to result in more direct improvements to habitats in streams like Ditch and Soda Creeks. Widespread natural recruitment of large woody debris, in addition to placement of debris in Lower Red River, Main Red River, Ditch Creek, Siegel Creek, and Lower South Fork Red

River, is expected to increase habitat complexity. This factor may help ameliorate any short-term increases in deposited sediment. In-channel restoration in Lower Red River would also provide short-term and long-term improvement in habitat for both bull trout and their prey species, as would structure maintenance and repair in Main Red River; sediment trap decommissioning in Moose Butte, Little Moose, Dawson, and Schooner Creeks; stream crossing upgrades; and riparian planting.

5. Risk Assessment

The Forest provided a risk assessment for each of the subwatersheds based on anticipated Project effects to indicators from the Matrix of Pathways and Indicators. The four Matrix indicators used were Water Yield, Sediment Yield, Suspended Sediment, and Harassment/disturbance. These indicators were chosen to best represent potential short-term effects from the Project to bull trout habitat, and potential short-term harassment or disturbance of individual bull trout when in-channel activities are occurring. Details of the analysis are displayed in Appendix D of this Opinion. Table 9 summarizes the results of the analysis.

Table 9. Assessment of risk to bull trout from Project implementation based on habitat quality, bull trout use and project effects to Matix indicators (K. Thompson, Nez Perce National Forest, 2006).

Subwatershed	Project Risk Rating	Habitat Quality Score[2]	Bull Trout Use[3]	Risk Grouping[4]
Middle Fork Red River	0	5	SR	Low
Red Horse Creek	3	5	FMO	Low
Upper SF Red River	3	5	SR	Low
Trapper Creek	2	5	FMO	Low
Baston Creek	0	5	SR	Low
Lower SF Red River	5	10	SR	Moderate
Ditch Creek	5	10	FMO	Moderate
Lowest Red River	6	10	FMO	Moderate
Moose Butte Creek	7	10	FMO	Moderate
Soda Creek	8	10	FMO	Moderate
Siegel Creek	9	10	FMO	Moderate
Dawson Creek	9	15	FMO	Moderate
Lower Red River	13	10	FMO	High
Little Moose Creek	11	15	FMO	Moderate
Main Red River	11	10	FMO	High

[1] Based on the analysis in this document
[2] From: Draft Red Pines Biological Opinion, USFWS December 2005, rates existing/baseline habitat condition, 10 = less degraded condition, 15 = most degraded condition, 5 = least degraded
[3] From: Draft Red Pines Biological Opinion, USFWS December 2005, SR = spawning/rearing, FMO = feeding, migration, overwintering
[4] Risk grouping based on consideration of project risk rating, habitat quality score, and bull trout use.

Based on the risk assessment provided by the Forest, Middle Fork Red River, Red Horse Creek, Upper SF Red River, Trapper Creek, and Baston Creek are all in the low risk category for bull trout. Lower Red River and Main Red River are in the high risk category. Subwatersheds in the highest risk category are Main Red River and Lower Red River. Main Red and Lower Red provide FMO habitat, so the high risk scores relate more to baseline habitat conditions and amount of management activity than to the type of bull trout use. The remaining subwatersheds are all in the moderate category. The Service agrees with the Forest's risk characteriziation with one exception. We consider bull trout in the Lower South Fork Red River to be in the high risk category. Because Lower South Fork Red River is designated as a spawning and early rearing area, the Service believes that bull trout in this subbasin may be at the greatest risk from negative Project impacts even though there is a lower level of management activity (compared to Main and Lower Red River).

In summary, three of the four streams with bull trout spawning and early rearing are at a relatively low risk of negative impacts from Project implementation. All of the subwatersheds that we have identified as being in high (relative to other subwatersheds in the action area) habitat condition and are considered bull trout population strongholds are in the low risk category. Very few, if any, Project activities are proposed in these areas. For instance the only activity proposed in the Middle Fork Red River subwatershed is decommissioning approximately 0.5 mile of road. Bull trout are most at risk in the Lower South Fork Red River where early rearing has been documented (and therefore spawning is assumed), the habitat condition is moderate, and Project activities are proposed.

However, overall the Project is not expected to increase the risk of extinction for the Red River local population of bull trout because of the low level of Project activity in bull trout strongholds within the local population, and projected long-term improvement in watershed/habitat conditions resulting from the proposed restoration activities.

B. Effects of Interrelated or Interdependent Actions

The Service considers any required maintenance of culverts and instream structures in bull trout habitat to be actions that are interrelated and interdependent with the Project. The temporal and spatial scope of these anticipated activities is not known, but short-term adverse effects to bull trout from increases in suspended and deposited sediment are expected. The Service assumes that effects to bull trout will be reduced but not eliminated by the use of best management practices.

V. CUMULATIVE EFFECTS

Cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Within the action area there are numerous state, tribal, local, and private actions that potentially affect bull trout. Many of the categories of on-going activities with potential effects to bull trout were identified in the Status of the Species section of this Opinion. These activities include timber harvest and road building, grazing, water diversion, residential development, small-scale mining, and agriculture. City, county, and state transportation departments conduct annual herbicide spraying of rights-of ways in the action area with unknown concentrations of herbicides potentially delivered to bull trout streams.

Most of the remaining bull trout spawning areas are located in headwater areas on Forest Service administered lands. State, tribal, local, and private actions potentially affecting bull trout, are located in the lower watershed areas which are primarily used by bull trout as FMO habitat. Thus, although these non-Federal actions are not directly affecting bull trout spawning areas they may be impacting migratory corridors and connectivity between local populations within the South Fork Clearwater core area.

Illegal and inadvertent harvest of bull trout is also considered a cumulative effect. Harvest can occur through both misidentification and deliberate catch. Schmetterling and Long (1999) found that only 44 percent of the anglers they interviewed in Montana could successfully identify bull trout. Similarly Polzin and Fredenberg (2005) surveyed anglers at Swan Lake, Montana, and found that only about 54 and 26 percent of the respondents could correctly identify adult and juvenile bull trout respectively. Being aggressive piscivores, bull trout readily take lures or bait (Ratliff and Howell 1992). Idaho Department of Fish and Game reports that, during the 2002 salmon and steelhead fishing seasons, 400 bull trout were caught and released in the regional (Clearwater administrative region) waters of the Salmon and Snake Rivers (Idaho Department of Fish and Game 2004). Spawning bull trout are particularly vulnerable to harvest because the fish are easily observed during autumn low flow conditions; however, the Forest reports very little angling in spawning areas in the Red River watershed (D. Mays, personal communication, January 2006),. Hooking mortality rates range from 4% for nonanadromous salmonids with the use of artificial lures and flies (Schill and Scarpella 1997) to a 60% worst case scenario for bull trout taken with bait (Idaho Department of Fish and Game 2001). Thus, even in cases where bull trout are released after being caught some mortality can be expected.

VI. CONCLUSION

The Service has reviewed the current status of bull trout, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects. It is the Service's biological opinion that the Project is not likely to jeopardize the continued existence of the South Fork Clearwater River core area or the Columbia River DPS of bull trout, and therefore the species (64 FR 58930, November 1, 1999).

The Service concludes that direct effects would be limited to short-term disturbance or harassment of migrating and resident adult bull trout with potential for harm and harassment to bull trout eggs, fry, and juvenile fish. Short-term and long-term indirect effects from proposed Project activities may occur but these effects are anticipated to occur only within the action area and should be minimized by the design criteria incorporated into the Project proposal. The Service expects that the numbers, distribution, and reproduction of bull trout in the action area, the Red River local population, the South Fork Clearwater core area, the Clearwater River management unit, or in the Columbia Basin DPS will not be significantly changed as a result of this Project. Reproduction is not expected to be appreciably altered, because Project activities will be very limited or absent in three of the four subwatersheds with identified bull trout spawning. However, spawning and early rearing bull trout in the Lower South Fork Red River may be negatively impacted by proposed treatments. Connectivity between the Red River local population and other local populations in the Clearwater River recovery unit will not be significantly affected. Proposed restoration actions should result long term improvements in habitat quality and connectivity. As such, we have concluded that the survival and recovery of bull trout populations will not be jeopardized by Project activities.

No critical habitat is designated in the action area so none will be affected.

VII. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Forest has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest fails to assume and implement the terms and conditions the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

A. Amount or Extent of Take

The Service expects that all bull trout (including eggs, alevins, fry, and spawning adults) in the immediate vicinity of stream crossing improvement sites and instream restoration activities (e.g., large woody debris placement) and within the downstream extent of sediment and/or turbidity effects (300 feet) may be subject to take in the form of harm or harassment. Similarly all bull trout occupying affected streams, whether resident or migratory, in the action area may be harmed by sediment pulses and hydrograph changes resulting from 3,455 acres of timber harvest and associated slash burning, road building, road reconstruction, and road decommissioning. The Service believes that the risk of take will be minimized through application of the design criteria and mitigation measures to be applied during implementation of the proposed action, which may reduce impacts to bull trout and bull trout habitat.

Survey and monitoring data indicate the presence of bull trout throughout the action area, including designated early rearing and spawning areas (strongholds) in the South Fork, Middle Fork, and Upper Red River. The Service anticipates that incidental take will only occur and be permitted during the following time period and in the following forms during the estimated 10 year life of the Project.

1. Take of bull trout (including eggs, alevins, and fry) in the form of harm or harassment associated with direct disturbance from instream Project activities such as stream crossing upgrades (including associated activities such as washing concrete equipment) and the placement of instream large woody debris in or near occupied bull trout habitat. These types of instream activities will be confined to a July 1 to August 15 work window.

2. Take of bull trout in the form of harm or harassment associated with the disturbance of substrate materials or sediment production, intentionally or unintentionally, while working in the stream channel between July 1 and August 15.

3. Take of bull trout in the form of harm or harassment from short-term habitat and food supply effects, and short-term changes in water quality resulting from both vegetation and restoration treatments.

4. Take of bull trout (including eggs, alevins, and fry) in the form of indirect harm resulting from habitat degradation due to increases in sediment yield and morphological channel changes in stream profile, pattern, and dimension in the short- and long-term associated with vegetation and fuels reduction treatments.

Incidental take will be limited to the following locations, life forms, and life stages that are likely to be affected.

1. The location of the expected incidental take is in Moose Butte Creek, Dawson Creek, Soda Creek, Red Horse Creek, Ditch Creek, Little Moose Creek, Lowest Red River, Baston Creek, Trapper Creek, Upper South Fork Red River, Siegel Creek, Lower South Fork Red River, Lower Red River, and Main Red River.

2. The life forms expected to be harmed or harassed include fluvial and resident bull trout.

3. The life stages expected to be harmed or harassed include adult and juvenile fish, as well as eggs, alevins, and fry.

The Service expects no direct lethal take of bull trout (including eggs, alevins, and fry). If the incidental take anticipated by this document (i.e., harm and harassment to bull trout within the action area) is exceeded, Project activities associated with this exceedence will cease and the Forest will immediately contact the Service to determine if consultation should be reinitiated. Authorized take will be exceeded if Project activities result in any bull trout (including eggs, alevins, and fry) mortality; instream restoration or stream crossing improvement activities result in suspended sediment exposure (concentration and duration) levels determined to have more than minor physiological effects to bull trout within 300 feet downstream of the instream work site; or if changes to bull trout habitat in the action area exceed what is predicted in the Assessment (including changes to sediment yield, cobble embeddedness, stream temperature, water quality, bank stability, or channel morphology). Authorized take will also be exceeded if instream work occurs outside of the July 1 to August 15 work window.

Bull trout may be injured or killed in the process of collecting and removing fish prior to instream work. This take has already been anticipated and analyzed in the Service's Biological Opinion for Idaho Department of Fish and Game's Scientific Collecting Permit (Service 2000), and will not be addressed in this Opinion.

B. Effect of the Take

The Columbia River DPS comprises 22 management units including the Clearwater River unit (Service 2002). The Clearwater management unit contains five core areas with 36 local populations. Red River contains the only local population within the action area. Most of the subwatersheds in the action area provide feeding, migrating, and overwintering habitat for bull trout. Early rearing (and therefore spawning) is only known to occur in the South Fork, Middle Fork, West Fork and Upper Red Rivers. With the exception of the Lower South Fork Red River, little or no Project treatment is proposed in these early rearing/spawning areas. Anticipated take may be reduced because the Project includes design criteria to avoid and reduce adverse effects. The probability that the proposed action will eliminate the Red River local population of bull trout is insignificant. Local bull trout densities and distribution in the affected streams are not expected to be significantly altered. As only one out of a total of 36 local populations may be affected by Project activities, it is unlikely that the proposed action would impair productivity or population numbers of bull trout in the Clearwater recovery units or in the Columbia River DPS. Watershed restoration activities, such as road decommissioning, are expected to result in long-term improvements in bull trout habitat conditions.

C. Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take from Project related activities in the action area.

1. Minimize the potential for harm to bull trout resulting from modifications of aquatic habitat associated with vegetation treatments; road construction, reconstruction, maintenance, and decommissioning; fuels reduction; and restoration actions.

2. Minimize the potential for harm to habitat and harm or harassment of bull trout associated with watershed restoration activities including installation of instream structures and culvert replacements.

3. Reduce the duration of disturbance and harassment of bull trout associated with instream work.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

will be based on stream size: 100 feet for first order streams, 200 feet for second order, and 300 feet for third order and higher. Turbidity will be measured during those times when turbidity is most likely to result from Project activities. All erosion and sediment control measures will be maintained until construction is complete and disturbed areas are stabilized.

3a. To avoid harassment effects, instream activities in or near occupied bull trout habitat shall only be conducted during daylight hours between July 1 and August 15. This work window may be adjusted on a site specific basis with Service approval.

E. Monitoring/Reporting

1. The Forest shall provide an annual report detailing Project implementation progress and baseline updates that will include results of applicable implementation and effectiveness monitoring, any bull trout surveys conducted in the Project area, a summary of bull trout observed or handled under the state Collecting Permit, as well as the results of monitoring revegetation efforts. The monitoring report will be sent to the Snake River Fish and Wildlife Office, 1387 South Vinnell Way, Suite 368, Boise, Idaho 83709 by March 1.

2. Upon locating dead, injured, or sick bull trout, or upon observing destruction of redds as a result of Project activities such activities shall be terminated and notification must be made within 24 hours to the Service's Division of Law Enforcement at (208) 378-5333. Additional protection measures will be developed through discussions with the Service.

3. During Project implementation the Forest shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for bull trout relative to the proposed activity.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act requires Federal Agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends that the Forest implement the following conservation measures.

1. In order to better assess sediment effects on bull trout from future instream projects, take suspended sediment samples at the turbidity monitoring stations established for the Project. Although turbidity and suspended sediment concentration are correlated, the relationship varies between individual streams and watersheds (Bash et al. 2001, Lewis et al. 2002, Rowe et al. 2003). Measuring suspended sediment will assist in making stream specific correlations between suspended sediment concentrations and turbidity.

2. Evaluate opportunities for selectively removing brook trout in areas where they coexist with bull trout and assess fish passage projects for their potential to facilitate brook trout access to isolated bull trout populations.

3. Monitor and evaluate all-terrain vehicle use of trails within the Project action area as press sources of sediment to aquatic systems in Project area. If assessment indicates these trails are adversely affecting aquatic systems then eliminate source of adverse effects by closing and rehabilitating trails or where closure is not feasible install bridges at stream crossings.

4. Promote recovery of bull trout in the action area by identifying potential habitat restoration opportunities and implementing these actions in the near-term.

5. Continue to survey and monitor bull trout populations and habitat in the action area using a suitable protocol (e.g., Peterson et al. 2002).

To keep the Service informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification on implementation of any conservation recommendations.

IX. REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

LITERATURE CITED

Bakke, P.D., B. Peck, and S. Hager. 2002. Geomorphic controls on sedimentation impacts. Eos. Trans. AGU, 83(47), Fall Meet. Suppl., Abstract H11C-0847.

Bash, J., C. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. Center for Streamside Studies, University of Washington, Seattle, Washington.

Baxter, C.V. C.A. Frissell, and F.R. Hauer. 1999. Geomorphology, logging roads, and the distribution of bull trout spawning in a forested river basin: implications for management and conservation. Transactions of the American Fisheries Society 128: 854-867.

Berg, R.K. and E.K. Priest. 1995. Appendix Table 1: A list of stream and lake fishery surveys conducted by U.S. Forest Service and Montana Fish, Wildlife and Parks fishery biologists in the Clark Fork River Drainage upstream of the confluence of the Flathead River from the 1950's to the present. Montana Fish, Wildlife, and Parks, Job Progress Report, Project F-78-R-1, Helena, MT.

Boag, T.D. 1987. Food habits of bull char, *Salvelinus confluentus*, and rainbow trout, *Salmo gairdneri*, coexisting in a foothills stream in northern Alberta. Canadian Field-Naturalist 101(1): 56-62.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1-4 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Brewin, P.A. and M.K. Brewin. 1997. Distribution maps for bull trout in Alberta. Pages 206-216 *in* Mackay, W.C., M.K. Brewin and M. Monita, editors. Friends of the Bull Trout Conference Proceedings.

Brosofske, K.D., J. Chen, R.J. Naiman, and J.F. Franklin. 1997. Harvesting effects on microclimatic gradients from small streams to uplands in western Washington. Ecological Applications 7: 1188-1200.

Buchanan, D. M. and S. V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. Pages 1-8 *in* Mackay, W.C., M.K. Brewin and M. Monita, editors. Friends of the Bull Trout Conference Proceedings.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55:75-81.

Castro, J. 2003. Geomorphic impacts of culvert replacement and removal: avoiding channel incision. Guidelines. U.S. Fish and Wildlife Service. Oregon Fish and Wildlife Office, Portland, Oregon.

Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley), from the American Northwest. California Fish and Game 64(3):139-174.

Chamberlin, T.W, R.D. Harr, F.H. Everest. 1991. Timber harvesting, silviculture, and watershed processes. In: Meehan W.R., ed. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. Spec. Publ. 19. Bethesda, Maryland: American Fisheries Society: 181-205.

Clearwater Basin Bull Trout Technical Advisory Team (CBBTTAT). 1998a. North Fork Clearwater River Basin Bull Trout Problem Assessment. Prepared for the State of Idaho by the CBBTTAT. May 1998.

Clearwater Basin Bull Trout Technical Advisory Team (CBBTTAT). 1998b. Bull Trout Assessment of the Lochsa and Selway Subbasin (including the Middle Fork Clearwater upstream of the South Fork). Prepared for the State of Idaho by the CBBTTAT. August 1998.

Clearwater Basin Bull Trout Technical Advisory Team (CBBTTAT). 1998c. South Fork Clearwater River Subbasin Bull Trout Problem Assessment. Prepared for the State of Idaho by the CBBTTAT. November 1998.

Clearwater Subbasin Summary (CSS). 2001. Draft Clearwater subbasin summary. Prepared for the Northwest Power Planning Council by interagency team, led by D. Statler, Nez Perce Tribe. May 25, 2001.

Cline, R., G. Cole, W. Megahan, R. Patten, and J. Potyondy. 1981. Guide for Predicting Sediment Yields from a Forested Watershed. U.S. Forest Service, Northern and Intermountain Regions.

Dechert, T., A. Storrar, and L. Woodruff. 2004. South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads. Prepared collaboratively by Idaho Department of Environmental Quality, the Nez Perce Tribe, and US Environmental Protection Agency. Idaho Department of Environmental Quality, Boise, Idaho. http://www.deq.state.id.us/water/tmdls/south_fork_clearwater/south_fork_clearwater_final.htm#docs

Dodds, W.K and M. R. Whiles. 2004. Quality and quantity of suspended particles in rivers: continent-scale patterns in the United States. Environmental Management 33:355-367.

Donald, D.B. and D.J. Alger. 1993. Geographic distribution, species displacement, and niche overlap for lake trout and bull trout in mountain lakes. Canadian Journal of Zoology 71:238-247.

Fish and Wildlife Service. 2000. Revised Section 7 Programmatic Consultation on Issuance of Section 10(a)(1)(A) Scientific Take Permits and Section 6(c)(1) Exemption from Take for Bull Trout (*Salvelinus confluentus*). Snake River Fish and Wildlife Office, Boise, Idaho.

Fish and Wildlife Service. 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.

Fish and Wildlife Service. 2004. Clearwater River Bull Trout Technical Reference. Fish and Wildlife Service, Boise, Idaho. April 2004.

Forest Service. 1999. South Fork Clearwater Biological Assessment. Nez Perce National Forest, Grangeville, Idaho.

Forest Service 2003a. Red River Ecosystem Analysis at the Watershed Scale. Nez Perce National Forest, Grangeville, Idaho.

Forest Service. 2003b. Environmental Assessment: Sentimental, Gabe, and Pete Creek Culvert Replacements, West Fork Ranger District. Bitterroot National Forest, Hamilton, Montana.

Forest Service. 2005a. Biological Assessment for Listed and Sensitive Species for the Red Pines Project. Nez Perce National Forest, Grangeville, Idaho.

Forest Service. 2005b. Red Pines FEIS. Nez Perce National Forest, Grangeville, Idaho.

Fraley, J.J. and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. Northwest Science 63(4):133-143.

Gloss, D.J. 1995. Evaluation of the NEZSED sediment yield model using data from forested watersheds in north-central Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho.

Goetz, F. 1989. Biology of the bull trout, *Salvelinus confluentus*, a literature review. Willamette National Forest. Eugene, OR.

Goetz, F.A. 1994. Distribution and juvenile ecology of bull trout (*Salvelinus confluentus*) in the Cascade Mountains. M.S. Thesis, Oregon State University, Corvallis, OR.

Gucinski, H., M.J. Furniss, R.R. Ziemer and M.H. Brookes. 2001. Forest Roads: A Synthesis of Scientific Information. General Technical Report PNW-GTR-509. U.S. Department of Agriculture, Forest Service, Portland, Oregon.

Gunckel, S.L., A.R. Hemmingsen, and J.L. Li. 2002. Effect of bull trout and brook trout interactions on foraging habitat, feeding behavior, and growth. Transactions of the American Fisheries Society 131: 1119-1130.

Harvey, B.C. and T.E. Lisle. 1998. Effects of suction dredging on streams: a review and an evaluation strategy. Fisheries 23: 8-17.

Henley, W.F., M.A. Patterson, R.J. Neves, and A. Dennis Lemly. 2000. Effects of sedimentation and turbidity on lotic food webs: a concise review for natural resource managers. Reviews in Fisheries Science 8(2): 125-139.

Hoelscher, B. and T.C. Bjornn. 1989. Habitat, densities, and potential production of trout and char in Pend Oreille Lake tributaries. Job Completion Report, Project F-71-R-10, Subproject III, Job No. 8. Idaho Department of Fish and Game. Boise, ID.

Idaho Department of Fish and Game, in litt. 1995. List of stream extirpations for bull trout in Idaho.

Idaho Department of Fish and Game. 2001. Regional Fisheries Management Investigations: North Fork Clearwater River Bull Trout. Project 9, Volume 128, Article 07. Idaho Department of Fish and Game, Lewiston, Idaho.

Idaho Department of Fish and Game. 2004. 2003 Bull Trout Conservation Program Plan and 2002 Report.

Jakober, M. 1995. Autumn and winter movement and habitat use of resident bull trout and westslope cutthroat trout in Montana. M.S. Thesis, Montana State University, Bozeman, MT.

Kishi, D., M. Murakami, S. Nakano, and Y. Taniguchi. 2004. Effects of forestry on the thermal habitat of Dolly Varden (*Salvelinus malma*). Ecological Research 19:283-290.

Korb, J.E., N.C. Johnson, and W.W. Covington. 2004. Slash pile burning effects on soil biotic and chemical properties and plant establishment: recommendations for amelioration. Restoration Ecology 12: 52-62.

Leathe, S.A. and P. Graham. 1982. Flathead Lake fish food habits study. E.P. A. through Steering Committee for the Flathead River Basin Environmental Impact Study.

Lewis, D.J., K.W. Tate, R.A. Dahlgren, and J. Newell. 2002. Turbidity and total suspended solid concentration dynamics in streamflow from California oak woodland watersheds. USDA Forest Service, Gen. Tech. Rep. PSW-GTR-184.

Light, J., L. Herger and M. Robinson. 1996. Upper Klamath Basin bull trout conservation strategy, a conceptual framework for recovery. Part One. The Klamath Basin Bull Trout Working Group.

Lisle, T. E. and S. Hilton. 1992. The volume of fine sediment in pools: an index of sediment supply in gravel-bed streams. Water Resources Bulletin 28:371-383. http://216.48.37.142/pubs/viewpub.jsp?index=3433

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management 7:34-45/

Lloyd, D.S., J.P. Koenings, and J.D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. North American Journal of Fisheries 7:18-33.

Luce, C.H. and T.A. Black. 2001. Effects of traffic and ditch maintenance on forest road sediment production. In Proceedings of the Seventh Federal Interagency Sedimentation Conference, March 25-29, 2001, Reno, Nevada. Pp. V67-V74.

Madej, M. A. 2001. Erosion and sediment delivery following removal of forest roads. Earth Surfaces Processes and Landforms 26: 175-190.

Meefe, G.K. and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc. Sunderland, MA.

Naohisa, K., R.F. Leary, and F.W. Allendorf. 2002. Evidence of introgressive hybridization between bull trout and brook trout. Transactions of the American Fisheries Society 131: 772-782.

National Marine Fisheries Service (NMFS). 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. National Marine Fisheries Service, Environmental and Technical Services Division, Habitat Conservation Branch.

Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediments and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16: 693-727.

Newton, J.A. and S. Pribyl. 1994. Bull trout population summary: Lower Deschutes River Subbasin. Oregon Department of Fish and Wildlife, The Dalles, OR.

Nielsen, J.L. 1998. Electrofishing California's endangered fish populations. Fisheries 23: 6-12.

NOAA Fisheries. 1998. Backpack Electrofishing Guidelines. Available: http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf

Oliver, G.G. 1979. Fisheries investigations in tributaries of the Canadian portion of the Libby Reservoir. Fish and Wildlife Branch, Kootenay Region.

Olson, J. and J. Brostrom. 1997. A survey of bull trout and resident fish populations in the Red River drainage, a tributary to the South Fork Clearwater River. Idaho Department of Fish and Game, Lewiston, Idaho.

Perry, D.A. 1998. The scientific basis of forestry. Annual Review of Ecology and Systematics 29: 435-466.

Peterson, J., J. Dunham, P. Howell, R. Thurow, S., and S. Bonar. 2002. Protocol for determining bull presence. Report to the Western Division of the American Fisheries Society. Available: http://www.wdafs.org/committees/bull_trout/bull_trout_committee.htm

Poff, R.J. 1996. Effects of silvicultural practices and wildfire on productivity of forest soils. Pages 477-494 in Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. University of California, Davis, California.

Polocek, M.C. and P.W. James. 2003. Diel microhabitat use of age-0 bull trout in Indian Creek, Washington. Ecology of Freshwater Fish 12:81-86.

Polzin, P. and W. Fredenberg. 2005. Salmonid fish recognition skills of anglers at Swan Lake, Montana. Fish and Wildlife Service, Kalispell, Montana.

Poole, G.C. and C.H. Berman. 2001. An ecological perspective on in-stream temperature: natural heat dynamics and mechanisms of human-caused thermal degradation. Environmental Management 27: 787-802

Potyondy, J.P., G.F. Cole, and W.F. Megahan. 1991. A procedure for estimating sediment yields from forested watersheds. Pages 12-46 to 12-54 in Proceedings: Fifth Federal Interagency Sedimentation Conference. Federal Energy Regulatory Commission, Washington, D.C. http://water.usgs.gov/pubs/misc_reports/FISC_1947-2001/html/pdf.html

Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 *in* Howell, P. J. and D. V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Quigley, T.M. and J.J. Arbelbide. 1997. An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great basins. Vol. III. 1174-1185pp.

Rashin, E. 1999. Effectiveness of Forest Road and Timber Harvest Best Management Practices With Respect to Sediment-Related Water Quality Impacts. Publication 317, Washington Department of Ecology, Olympia, Washington.

Ratliff, D. E. and P. J. Howell. 1992. The Status of Bull Trout Populations in Oregon. Pages 10-17 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Rich, C.F., Jr. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. M.S. thesis. Montana State University, Bozeman, MT.

Rich, C.F., Jr., T.E. McMahon, B.E. Rieman, and W.L. Thompson. 2003. Local-habitat, watershed, and biotic features associated with bull trout occurrence in Montana streams. Transactions of the American Fisheries Society 132: 1053-1064.

Rieman, B.E. and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21: 756-764.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302, Intermountain Research Station, U.S. Department of Agriculture, Forest Service, Boise, ID. (Bull Trout - B58).

Rieman, B.E. and J.D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124 (3):285-296.

Rieman, B.E. and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16:132-141.

Rieman, B.E., D.C. Lee and R.F. Thurow. 1997. Distribution, status and likely future trends of bull trout within the Columbia River and Klamath basins.

Robichaud, P.R. 2000. Fire effects on infiltration rates after prescribed fire in Northern Rocky Mountain forests, USA. Journal of Hydrology 231-232 (2000) 220-229.

Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.H. Lachner, R.N. Lea and W.B. Scott. 1980. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society Special Publication 12, Bethesda, MD.

Rode, M. 1990. Bull trout, *Salvelinus confluentus* Suckley, in the McCloud River: status and recovery recommendations. Administrative Report Number 90-15. California Department of Fish and Game, Sacramento, CA.

Rowe, M., D. Essig, and B. Jessup. 2003. Guide to Selection Sediment Targets for Use in Idaho TMDLs. Idaho Department of Environmental Quality, Boise, Idaho. June 2003.

Saldi-Caromile, K., K. Bates, P. Skidmore, J. Barenti, and D. Pineo. 2004. Stream Habitat Restoration Guidelines: Final Draft. Co-published by the Washington Departments of Fish and Wildlife and Ecology and the U.S. Fish and Wildlife Service. Olympia, Washington.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5:18-32.

Schill, D.J. 1992. River and stream investigations. Idaho Department of Fish and Game.

Schill, D.J. and R.L. Scarpella. 1997. Barbed hook restrictions in catch-and-release trout fisheries: a social issue. North American Journal of Fisheries Management 17(4): 873-881.

Schmetterling, D.A. and M.H. Long. 1999. Montana anglers' inability to identify bull trout and other salmonids. Fisheries 24: 24-27.

Sedell, J.R. and F.H. Everest. 1991. Historic changes in pool habitat for Columbia River Basin salmon under study for TES listing. Draft U.S. Department of Agriculture Report. Pacific Northwest Research Station, Corvallis, OR.

Sexauer, H.M. and P.W. James. 1997. Microhabitat use by juvenile trout in four streams located in the Eastern Cascades, Washington. Pages 361-370 *in* Mackay, W.C., M.K. Brown and M. Monita, editors. Friends of the Bull Trout Conference Proceedings.

Spence, B.C., G.A. Lomincky, R.M. Hughes and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. National Marine Fisheries Service, U.S. Fish and Wildlife Service, Environmental Protection Agency.

Spruell, P., A.R. Hemmingsen, P.J. Howell, N. Kanda, and F.W. Allendorf. 2003. Conservation genetics of bull trout: geographic distribution of variation at microsatellite loci. Conservation Genetics 4:17-29.

Troendle, C.A. and W.K Olsen. 1994. Potential effects of timber harvest and water management on streamflow dynamics and sediment transport. In: Sustainable Ecological Systems Proceedings. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, GTR RM-247, 34-41

Thomas, G. 1992. Status of bull trout in Montana. Report prepared for Montana Department of Fish, Wildlife and Parks, Helena, MT.

Tu, M., C. Hurd and J.M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy. http://tncweeds.ucdavis.edu, version: April 2001.

Washington Department of Fish and Wildlife. 1997. Washington State salmonid stock inventory. Bull trout/Dolly Varden. September 1997. 437pp.

Watson, G. and T. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation into hierarchical scales. North American Journal of Fisheries Management 17:237-252.

Whitesel, T.A., J. Brostrom, T. Cummings, J. Delavergne, W. Fredenberg, H. Schaller, P. Wilson, and G. Zydlewski. 2004. Bull Trout Recovery Planning: A review of the science associated with population structure and size. Science Team Report #2004-01. U.S. Fish and Wildlife Service, Regional Office, Portland, Oregon.

Wondzell, S.M. and J.G. King. 2003. Postfire erosional processes in the Pacific Northwest and Rocky Mountain regions. Forest Ecology and Management 6238 (2003) 1-13.

Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River subbasin, Oregon. Pages 18-29 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

APPENDIX A. Ratings for habitat indicators by subwatershed and Habitat Quality Score. For scoring based on indicator conditions: Low=1, Moderate=2, High=3. Highest potential scores for the three indicators combined: High=12, Moderate= 8, and Low=4.

Subwatershed	Cobble Embeddedness High < 20% Mod 20-30% Low >30%	Sediment Yield High </= 5% Mod 6-15% Low >15%	Watershed Road Density High < 1mi/sq.mi. Mod 1-3 mi/sq.mi. Low >3 mi/sq.mil	Water Yield (ECA) High < 15% Mod 15-20% Low>20%	Habitat Quality Score
Dawson Cr	Low	Low	Low	Low	4
Lower Red River	Low	Low	Low	High	6
Siegel Cr	Low	Low	Low	High	6
Ditch Cr	Low	Low	Low	High	6
Trail Cr	Low	Mod	Mod	High	8
Baston Cr	Low	Mod	Mod	High	8
Soda Cr	Low	Low	Low	High	6
Main Red River	Low	Low	Mod	High	7
Schooner Cr	Low	Low	Low	High	6
Trapper Cr	Low	Mod	Mod	High	8
Pat Brennan Cr	Low	Mod	Low	High	7
Lower SF Red R	Low	Mod	Low	High	7
Upper SF Red R	Mod	Mod	Low	High	8
MF Red River	Mod	Mod	Mod	High	9
Moose Butte Cr	Low	Low	Low	High	6
Little Moose Cr	Low	Low	Low	Mod	5
Blanco Cr	Low	Low	Low	Mod	5
Deadwood Cr	Low	Low	Low	Mod	5
Red Horse Cr	Low	Mod	Mod	High	8
French Gulch	Low	Low	Mod	High	7
Campbell Cr	Low	Low	Low	High	6
Lowest Red R	Low	Low	Low	High	6

APPENDIX B. PROJECT DESIGN CRITERIA (PDC). This is a partial listing of design criteria only showing those addressing effects identified in this Opinion; see Assessment for a complete list.

#	Project Design and Mitigation Measure
1	No fuel reduction activities would occur in Inventoried Roadless Areas
4	No removal of trees would be allowed in all streamside or wetland RHCAs, except at temporary road crossings and to facilitate anchoring of cable yarding systems.
5	Fuels would not be ignited within RHCA's, but fire may be allowed to back into these areas when fire intensity would be low and burning would not result in extensive tree canopy cover or exposure of bare soil.
6	Landslide prone areas are also considered Riparian Habitat Conservation Areas (RHCAs). No timber harvest or road construction would occur in areas of high landslide hazard. Timber harvest, road construction, or fuel reduction in areas of moderate landslide risk would be modified as needed to protect slope stability. If additional, unmapped landslide prone areas are found during project implementation, areas would be dropped or activities would be modified with watershed specialist oversight to protect slope stability.
8	Complete site-specific review of treatment units prior to implementation to identify extent of detrimental soil disturbance. Planned activities would be modified in any proposed fuel reduction unit that is found to have previously unidentified soil impacts from past human-caused disturbance. The planned activities in that unit would be modified or dropped to ensure that cumulative impacts would not exceed Forest Plan soil quality standard number 2, as amended, upon completion of activities, and/or that a net improvement is established through restoration.
9	Tractor harvest and/or excavator use would be limited to slopes less than 35 percent.
10	Fuel reduction activities would be coordinated with soil restoration activities for greatest efficiency.
11	Broadcast burning would be applied in preference to excavator piling wherever practical to reduce soil damage.
12	Temporary roads would be built, used, and decommissioned within a 1- to 3-year period, in order to reduce the amount of sediment production.
13	New, temporary roads would be constructed using minimal road widths and out-sloped surface drainage.
14	Coarse woody debris greater than 3 inches diameter would be retained in fuel reduction units in amounts to meet guidelines in Table F-1 (see Appendix F). This would also comply with LCAS for lynx.
16	Winter harvesting would be allowed only during frozen conditions. Frozen conditions are defined as greater than 4 inches of frozen ground, a barrier of snow greater than two feet in depth (unpacked snow), or one foot in depth (settled snow).
17	Sediment and erosion control measures such as dewatering culverts, sediment barriers, rocking road surfaces and/or ditches, etc., would be used as needed when constructing, reconstructing, and decommissioning roads and stream/road crossing improvements, to protect fish habitat and water quality.
18	Activities in fish bearing streams would be allowed between July 1 and August 15 to avoid sediment deposition on emerging steelhead or Chinook redds. These dates may be site-specifically adjusted through coordination with Central Idaho Level I team review and approval.

APPENDIX B. PROJECT DESIGN CRITERIA (PDC). This is a partial listing of design criteria only showing those addressing affects identified in this Opinion; see Assessment for a complete list, continued.

#	Project Design and Mitigation Measure
19	Stream crossing placements would provide for channel width, flow velocities, substrate condition, and stream gradients that approximate the natural channel and accommodate passage of streamflow, debris, fish, and other aquatic organisms. When designing new structures, consider and give preference to open-bottom arches, bridges and oversized culverts.
20	A Spill Prevention Control and Countermeasures Plan (40 CFR 112) would be prepared and implemented that incorporates the rules and requirements of the Idaho Forest Practices Act Section 60, Use of Chemicals and Petroleum Products; and US Department of Transportation rules for fuels haul and temporary storage; and additional direction as applicable.
21	During instream habitat improvement activities, tree felling in RHCA's would occur only where that activity would not affect Riparian Management Objectives for shade and wood debris recruitment.
38	Decommission temporary roads within three years after construction. Additional measures may be implemented to ensure access restriction, including over-snow access by snowmobiles in winter. This would be done at conclusion of project activities.
	MITIGATION MEASURES
A	For instream activities in fish-bearing streams that contain listed species, fish are expected to disperse from the project area. If it is determined necessary, additional measures would be used to ensure fish are not harmed or killed by instream activity. If electrofishing is necessary, it would be conducted in accordance with NOAA Fisheries electrofishing guidelines found at http://www.nwr.noaa.gov.
B	Restrict fuel reduction, soils and watershed restoration activities when soils are wet, to prevent resource damage (rutting, displacement, erosion).
C	Locate and design skid trails, landings and yarding corridors prior to activities to minimize the area of detrimental soil effects. Space tractor skid trails 80 to 120 feet apart, except where converging on landings, to reduce the area of detrimental soil disturbance. This does not preclude the use of feller bunchers if soil impacts can remain within standards.
D	Minimize equipment trafficking, excessive piling, and redistribution of slash on excavator piled units. Numerous small piles are preferred over few large piles, to avoid nutrient loss and soil damage.
E	Use cable systems with one-end or full suspension wherever possible to minimize soil disturbance.
F	Stockpile and replace topsoil on excavated landings after scarification as negotiated with contractor during implementation.
G	Scarify and recontour excavated skid trails and excavated landings to restore slope hydrology and soil productivity except when restoration would compound negative impacts.
H	Decompact non-excavated skid trails and landings compacted or entrenched 3 inches or more to a depth of 4 to 10 inches, or as directed by contract administrator (working with forest soil scientist), to restore soil permeability.
J	Retain areas of intact functioning riparian vegetation where possible during stream restoration work.

APPENDIX C. Proposed restoration actions by subwatershed showing habitat condition, bull trout use, and total amount of restoration.

Subwatershed	Condition	BT Use	Miles Road Decomm	Acres Soil Restoration	Acres Mine Rehab	# Stream Crossing Imprvt.	Miles LWD Placement	Miles Riparian Imprvt.	Miles Structure Maint.	Miles Instream Imprvt.	Total Restoration
MF Red River	H	SR	0.53	0	0	0	0	0	0	0	.53
Red Horse Creek	H	FMO	0	0	0	0	0	0	0	0	0
Upper SF Red River	H	SR	4.69	2.8	0	1	0	0	0	0	8.49
Trapper Creek	H	FMO	2.01	2.8	0	0	0	0	0	0	4.81
Baston Creek	H	SR	0.13	0	0	0	0	0	0	0	0.13
Lower SF Red River	M	SR	3.55	3.7	0	2	1.9	1.9	0	0	13.05
Main Red R.	M	FMO	14.0	28.3	2.0	2	10.0	20.0	5.0	5.0	86.3
Lowest Red R.	M	FMO	6.65	5.4	0	0	7.4	7.4	0	0	26.85
Moose Butte Creek	M	SR	0.26	1.0	4.0	0	1.8	1.8	1.0	0	9.86
Soda Cr.	M	FMO	4.72	10.8	0	15	0	0	0	0	30.52
Ditch Cr.	M	FMO	5.81	14.6	6.0	0	0.2	0.1	0	0	26.71
Siegel Cr.	M	FMO	0.20	2.5	0	5	2.6	0	0	0	10.3
Lower Red R.	M	FMO	18.8	30.4	8.0	7	10.0	3.0	0	3.75	80.95
Little Moose Cr.	L	FMO	11.6	14.4	4.0	4	0	0	0.5	0	34.5
Dawson Cr.	L	FMO	7.82	18.8	10	5	0	0	0	1.5	43.12

APPENDIX D. Risk Assessment for Bull Trout/Red Pines Watersheds (K. Thompson Nez Perce National Forest, 2006)

1. Risk Assessment

Table 1 below displays the results of a project risk assessment conducted for Alternative E, Red Pines FEIS. A description of the details of this analysis follows. This table and supporting analysis could be used in lieu of APPENDIX D in the Draft USFWS Biological Opinion for bull trout.

Table 1. Project risk ratings for Red River subwatersheds potentially affected by Alternative E, Red Pines FEIS. Only watersheds including potential effects to bull trout were assessed. Includes short-term effects only.

Subwatershed	Project Risk Rating[1]	Habitat Quality Score[2]	Bull Trout Use[3]	Risk Grouping[4]
Middle Fork Red River	0	5	SR	Low
Red Horse Creek	3	5	FMO	Low
Upper SF Red River	3	5	SR	Low
Trapper Creek	2	5	FMO	Low
Baston Creek	0	5	SR	Low
Lower SF Red River	5	10	SR	Moderate
Ditch Creek	5	10	FMO	Moderate
Lowest Red River	6	10	FMO	Moderate
Moose Butte Creek	7	10	FMO	Moderate
Soda Creek	8	10	FMO	Moderate
Siegel Creek	9	10	FMO	Moderate
Dawson Creek	9	15	FMO	Moderate
Lower Red River	13	10	FMO	High
Little Moose Creek	11	15	FMO	Moderate
Main Red River	11	10	FMO	High

[1] Based on the analysis in this document
[2] From: Draft Red Pines Biological Opinion, USFWS December 2005, rates existing/baseline habitat condition, 10 = less degraded condition, 15 = most degraded condition, 5 = least degraded
[3] From: Draft Red Pines Biological Opinion, USFWS December 2005, SR = spawning/rearing, FMO = feeding, migration, overwintering
[4] Risk grouping based on consideration of project risk rating, habitat quality score, and bull trout use.

APPENDIX D. Continued.

2. Methods Used to Determine Project Risk Ratings by Subwatershed

Four indicators were used to obtain risk ratings for each subwatershed. These indicators were taken from the Clearwater Interagency Level 1 Team Matrix of Pathways and Indicators for listed steelhead and bull trout. Numerical risk ratings were assigned to each indicator and summed to obtain the numbers displayed above in Table 1. Possible ratings range from 0 to 16. The ratings were based on considerate of probability of effect combined with potential magnitude of effect. This rating system was used in 1998 when effects to all the 5th code HUC watersheds were assessed and incorporated in the 1999 subbasin biological assessments. In summary, the rating system was based on the following table:

Table 2. Rating system for project risk analysis.

	Probability of Effect				
Potential Level of Effect	None	Very Low	Low	Moderate	High
None	0	0	0	0	0
Very Low	0	1	1	1	1
Low	0	1	1	2	2
Moderate	0	2	3	3	4
High	0	3	4	4	4

APPENDIX D. Continued.

Matrix indicators used to assess project risk include water yield, sediment yield, suspended sediment, and harassment/disturbance. These indicators were chosen to best represent potential effects from the project to habitat focusing on short-term effects only, and potential short-term harassment or disturbance of individual bull trout when in-channel activities are occurring.

Water yield: this effect pathway included potential effects from fuel treatment units, temporary road construction, and prescribed burning. Calculations of equivalent clearcut area (ECA) were applied to above table. In general, ECA increases of one or two percent were considered to have a low probability of effect and a very low potential of effect, resulting in a risk rating of 1. All post-project ECA in the watersheds displayed above in Table 1 were below 15 percent.

Sediment yield: this effect pathway included potential effects from fuel treatment units, temporary road construction, road reconditioning, road decommissioning, post harvest fuel treatment, mine rehabilitation, and soil restoration. Indicators used included NEZSED predictions of peak sediment yield, which include short-term sediment effects from fuel treatment units, temporary road construction, road reconditioning, and road decommissioning. Other indicators considered included acres of soil restoration, number of site of mine rehabilitation, and acres of post harvest (slash) fuel treatments.

Suspended Sediment: this effect pathway included potential effects from in-channel reconstruction and improvements, stream crossing upgrades, sediment trap decommissioning, and maintenance of existing habitat improvement structures. Indicators used included length of in-channel reconstruction, number, location and type of stream crossing upgrades, number of sediment traps proposed for decommissioning, and miles of stream structure maintenance.

Harassment/Disturbance: this effect pathway included potential disturbance to individual bull trout from increases in suspended sediment and use of machinery and/or persons working in or adjacent to streams. Indicators used included miles of in-channel reconstruction, number, location and type of stream crossing upgrades, number of sediment traps proposed for decommissioning, miles of stream structure maintenance, and miles of large woody debris placement.

3. Analysis of Project Risk Ratings Displayed in Table 1

Middle Fork Red River

Water yield:	change in ECA = 0
	Risk rating = 0.
Sediment yield:	NEZSED existing sediment yield = 10 percent over base.
	NEZSED peak sediment yield = 10 percent over base.
	Acres soil restoration = 0
	Acres slash treatment = 0
	Mine site rehab = 0
	Risk rating = 0
Suspended sediment:	Channel reconstruction = 0

APPENDIX D. Continued.

	Sediment trap decommission = 0
	Number of crossing upgrades = 0
	Structure maintenance = 0
	Risk rating = 0
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 0
Total risk rating = 0	

Red Horse Creek

Water yield:	Existing ECA = 6 percent
	Predicted ECA = 7 percent
	Risk rating = 0
Sediment yield:	Existing sediment yield = 13 percent over base
	Predicted sediment yield = 14 percent over base
	Acres soil restoration = 0
	Acres slash treatment = 66
	Mine site rehab = 0
	Risk rating = 1
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 1
	Structure maintenance = 0
	Risk rating = 1
Harass/disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 1
Total risk rating = 3	

Upper South Fork Red River

Water yield:	Existing ECA = 8
	Predicted ECA = 9
	Risk rating = 0
Sediment yield:	Existing yield = 10 percent over base
	Predicted peak yield = 10 percent over base
	Acres soil restoration = 0
	Acres slash treatment = 28
	Mine site rehab = 0
	Risk rating = 1
Suspended sediment:	Channel reconstruction = 0

APPENDIX D. Continued.

	Sediment trap decommission = 0
	Number of crossing upgrades = 1
	Structure maintenance = 0
	Risk rating = 1
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 1
Total rating = 3	

Trapper Creek

Water yield:	Existing ECA = 8 percent
	Predicted ECA = 11 percent
	Risk rating = 1
Sediment yield:	Existing yield = 11 percent over base
	Predicted peak yield = 11 percent over base
	Acres soil restoration = 2.8
	Acres slash treatment = 176
	Mine site rehab = 0
	Risk rating = 1
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 0
	Structure maintenance = 0
	Risk rating = 0
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 0
Total risk rating = 2	

Baston Creek

Water yield:	No change in ECA
Sediment yield:	Existing yield = 8 percent over base
	Predicted peak yield = 8 percent over base
	Acres soil restoration = 0
	Acres slash treatment = 0
	Mine site rehab = 0
	Risk rating = 0
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 0
	Structure maintenance = 0

APPENDIX D. Continued.

	Risk rating = 0
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 0
Total risk rating = 0	

Lower South Fork Red River

Water yield:	Existing ECA = 8
	Predicted ECA = 11
	Risk rating = 1
Sediment yield:	Existing yield = 15 percent over base
	Predicted peak yield = 17 percent over base
	Acres soil restoration = 3.7
	Acres slash treatment = 388
	Mine site rehab = 0
	Risk rating = 2
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 2
	Structure maintenance = 0
	Risk rating = 1
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0
	Risk rating = 1
Total risk rating = 5	

Main Red River

Water yield:	Existing ECA = 5
	Predicted ECA = 11
	Risk rating = 1
Sediment yield:	Existing yield = 20 percent over base
	Predicted peak yield = 24 percent over base
	Acres soil restoration = 28.3
	Acres slash treatment = 999
	Mine site rehab = 0
	Risk rating = 3
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 2

APPENDIX D. Continued.

	Structure maintenance = 5 miles
	Risk rating = 3
Harass/Disturbance:	same as suspended sediment
	LWD placement = 10 miles
	Risk rating = 4
Total risk rating = 11	

Lowest Red River

Water yield:	Existing ECA = 9
	Predicted ECA = 12
	Risk rating = 1
Sediment yield:	Existing yield = 23 percent over base
	Predicted peak yield = 27 percent over base
	Acres soil restoration = 5.4
	Acres slash treatment = 74
	Mine site rehab = 0
	Risk rating = 3
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 0
	Structure maintenance = 0 miles
	Risk rating = 0
Harass/Disturbance:	same as suspended sediment
	LWD placement = 7.4 miles
	Risk rating = 2
Total risk rating = 6	

Moose Butte Creek

Water yield:	No change in ECA
	Risk rating = 0
Sediment yield:	No change in sediment yield
	Acres soil restoration = 1.0
	Acres slash treatment = 0
	Mine site rehab = 4 acres
	Risk rating = 1
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 1
	Number of crossing upgrades = 0

APPENDIX D. Continued.

	Structure maintenance = 1 mile
	Risk rating = 3
Harass/Disturbance:	same as suspended sediment
	LWD placement = 7.4 miles
	Risk rating = 2
Total risk rating = 6	

Soda Creek

Water yield:	Existing ECA = 12 percent
	Predicted ECA = 14 percent
	Risk rating = 1
Sediment yield:	Existing yield = 22 percent over base
	Predicted peak yield = 25 percent over base
	Acres soil restoration = 10.8
	Acres slash treatment = 34
	Mine site rehab = 0
	Risk rating = 2
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 15
	Structure maintenance = 0 miles
	Risk rating = 3
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0 miles
	Risk rating = 2
Total risk rating = 8	

Ditch Creek

Water yield:	Existing ECA = 13 percent
	Predicted ECA = 14 percent
	Risk rating = 1
Sediment yield:	Existing yield = 26 percent over base
	Predicted peak yield = 30 percent over base
	Acres soil restoration = 14.6
	Acres slash treatment = 43
	Mine site rehab = 0
	Risk rating = 3
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 0

APPENDIX D. Continued.

	Structure maintenance = 0
	Risk rating = 0
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0.1 miles
	Risk rating = 1
Total risk rating = 5	

Siegel Creek

Water yield:	Existing ECA = 8 percent
	Predicted ECA = 11 percent
	Risk rating = 1
Sediment yield:	Existing yield = 23 percent over base
	Predicted peak yield = 26 percent over base
	Acres soil restoration = 2.5
	Acres slash treatment = 380
	Mine site rehab = 0
	Risk rating = 3
Suspended sediment:	Channel reconstruction = 0
	Sediment trap decommission = 0
	Number of crossing upgrades = 5
	Structure maintenance = 0 miles
	Risk rating = 2
Harass/Disturbance:	same as suspended sediment
	LWD placement = 2.6 miles
	Risk rating = 3
Total risk rating = 9	

Lower Red River

Water yield:	Existing ECA = 8 percent
	Predicted ECA = 12 percent
	Risk rating = 1
Sediment yield:	Existing yield = 22 percent over base
	Predicted peak yield = 27 percent over base
	Acres soil restoration = 30.4
	Acres slash treatment = 781
	Mine site rehab = 8 acres
	Risk rating = 4
Suspended sediment:	Channel reconstruction = 0.5 miles
	Sediment trap decommission = 0
	Number of crossing upgrades = 7

APPENDIX D. Continued.

	Structure maintenance = 3 miles
	Risk rating = 4
Harass/Disturbance:	same as suspended sediment
	LWD placement = 10 miles
	Risk rating = 4
Total risk rating = 13	

Dawson Creek

Water yield:	No change in ECA
	Risk rating = 1
Sediment yield:	No short-term change in sediment yield
	Acres soil restoration = 10.8
	Acres slash treatment = 9
	Mine site rehab = 10 acres
	Risk rating = 1
Suspended sediment:	Channel reconstruction = 1.5 mi
	Sediment trap decommission = 1
	Number of crossing upgrades = 5
	Structure maintenance = 0 miles
	Risk rating = 4
Harass/Disturbance:	same as suspended sediment
	LWD placement = 0 miles
	Risk rating = 3
Total risk rating = 9	

APPENDIX E. Rationale for Turbidity Threshold

Newcombe and Jensen (1996) predicted adverse effects (minor physiological distress, reduced feeding rate) to adult and juvenile salmonids when exposed to suspended sediment concentrations of 55 mg/l for three hours. This is the approximate threshold we are trying to establish for the Project. Turbidity is less difficult and more economical to measure than suspended sediment and studies show correlations between the two parameters. Turbidity measurements take 30 seconds and can be done on site and therefore allow for rapid adjustments in Project activities if turbidity approaches unacceptable levels. However, the relationship between turbidity and suspended sediment varies between watersheds and even between different locations within the same watershed (Henley et al. 2000). It appears, after reviewing the literature (Lloyd 1987, Lloyd et al. 1987, Dodds and Whiles 2004), that 25 NTUs provides an approximation of the desired 55 mg/l threshold. In the action area, 25 NTUs may actually correspond to a higher (or lower) suspended sediment concentration, but even at levels as high as 403 mg/l, generally similar sublethal effects are expected for an exposure duration of three hours (Newcombe and Jensen 1996). Not knowing the exact relationship between turbidity and suspended sediment in the Red River watershed, applying the 25 NTU threshold appears reasonable in terms of reducing risks to bull trout.